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BRIEFLY TOLD.

RESIDUALS.—In the current number of the JOURNAL is published a paper on the "Utilization of Residual Products," read before the Society of Gas Lighting by Mr. Charles H. Nettleton. That the paper, with the facts therein stated, will be valuable to the gas fraternity, we think there can be no doubt; but more especially will this be the case to the managers of small gas works. What has been done—as is evidenced by the figures furnished—can be repeated in any instance if the proper desire aims to that end. The policy of preparing coke by breaking it to suitable sizes for ordinary house purposes is one we have always advocated, and it is one which, if followed out thoroughly, would certainly prove profitable to those pursuing such a course. The value of coke as fuel is appreciated by many who have had it in use, and who would still be using it could they obtain it in suitable sizes to meet their requirements. Coke as ordinarily delivered to consumers is too large in size for the kitchen range (where most of the coke made could be used), and only applicable for grate fires or in basement heaters. Then, why not prepare coke for use as anthracite coal is now furnished? Were this done, we firmly believe that all the coke now manufactured in this vicinity would be absorbed entirely for household purposes. In Mr. Nettleton's paper it will be seen that in the past year he has had returned 71.5 per cent. of the cost of coal used. This is a remarkable statement, but the figures furnished prove this to be the case; and that it is so must certainly be not only very satisfactory to him, but also to the Company he so ably represents.

RULES AND REGULATIONS FOR PIPING NEW BUILDINGS.—The following rules and regulations, issued by the Cincinnati Gas Company, we publish entire for the benefit of others engaged in the business of supplying gas. The question is frequently asked us, "What sized pipe ought to be used in fitting up buildings, that the quantity of gas demanded may be readily obtained?" As a reply to all such questions we would simply say, follow out in piping buildings the rules given below, and avoid all trouble in the future, by thus having the pipes adequate for the supply required.

"*Notice to Architects.*—You are respectfully requested to include in all specifications for new houses an outlet for a gas cooking stove in kitchen; also same for gas heating stoves or logs in suitable parts of houses. Said outlets not to be less than one-half inch, taken from a three-fourth inch line. For running pipes in houses for lighting purposes the following rules will give the necessary information. Should special information be required the Superintendent of Distribution is always ready to give same:

"1. The tubing and fittings for the conveyance of gas within any building, after it has passed the meter, may be put up by any competent gas fitter employed by the consumer or proprietor of the premises; subject, however, to the inspection and approval of the Company, which requires the inspection of all pipe before it is covered over by plastering or flooring.

"The notice for inspection must be accompanied by a plan of the fittings, drawn to a scale of one inch to eight feet, on which must be marked the size and length of tubing, from joint to joint, and the position of the burners—said plans to be numbered by the inspector to correspond with the register of application, and filed in the office for future inspection.

"2. All tubing and screws must be of wrought iron, brass or copper,

but no more of the latter than may be required to run from the ceiling or wall to a gas burner. All T's, L's, X's, springs, bends, etc., must be of hard brass (gun metal) or iron. All stop-cocks must be plugged and bushed with brass, and the ways equal to the bore of the tubing, and all fittings must be put together with gas fitter's cement when the inspector shall require it.

"3. After all the fittings are completed written notice must be given at the office of the Company, whose inspector will examine the work, in whose presence air shall be forced into the whole of the fittings until the pressure is equal to 30 inches of mercury; and unless the fittings shall be perfectly tight under such pressure, and otherwise satisfactory to the Company, the gas will in no case be supplied.

"4. Drop and bracket outlets must be well fastened with gas hooks. Nails will not be allowed. Split pipes or fittings will not be accepted even though skillfully cemented. All risers must start from the cellar and so run that required extensions to meters may avoid cellar openings. All pipes must be well fastened and entirely free from "traps." Under no circumstances will "drips" be allowed except where absolutely unavoidable.

"5. No riser in any building must be of less than ¾-inch pipe, except where there are but three outlets, when ½ inch pipe will be allowed. In buildings with large rooms the drops must be ½-inch, with a set from the main line of pipe of not less than 4 inches, dropped square and well secured by gas hooks *or straps* to the joists. The same rule to be observed on all cross lines of pipe. No outlets intended for gas stoves must be of less size than ½ inch.

"6. In all cases where *alterations* are required to be made, notice must be given at the office of the Company on the day previous, to enable the Company to turn off the gas. As soon as the work is completed, the same rules must be observed as in Rule 3.

"7. The following table exhibits the proportionate length and size of tubing permitted by the Company to be used:

Tubing.	Greatest Length Allowed.	Greatest No of Outlets.
⅜ inch.....	20 feet.....	2 outlets.
½ "	30 "	3 "
⅝ "	60 "	10 "
1 "	70 "	15 "
1¼ "	100 "	30 "
1½ "	150 "	60 "
2 "	200 "	100 "

[A rule we established while actively engaged in gas manufacture and supply was this: When the piping in a building was inspected and passed upon by the inspector, a printed card was given the fitter, certifying that the piping placed in the building was in accordance with the regulations of the gas company, and the work had been done in a proper and acceptable manner. When the fitter demanded payment for his work he had to produce this card and present it to the party for whom the work was done. Then, when the application for a service into the premises was made at the Company's office, the card accompanied the application, as evidence that the appliances were in accordance with the rules and regulations.—Ed.]

Supt. Diffenbaugh, of the Tyrone (Pa.) Gas and Water Company, sends us the following batch of items concerning the recent unparalleled floods throughout his section of the State: "At Tyrone the water entered the retort room and office, reaching 8 inches above the center-seal; but as the drip siphons were all capped the manufacture of gas was not stopped, although work was proceeded with under considerable difficulty. In the town some of the meters floated and broke the connections, the water eventually finding its way into the mains and necessitating the shutting off of the gas at about 2 A.M. of May 31; but before the following night the supply was being furnished as usual. At Huntington the Gas Company employ the Lowe water gas process, and also operate a bench of 5's. Here the retort house was flooded to the depth of 11 feet. The oil tank, situated in the yard, and containing at the time a carload of oil, floated and broke away from its fastenings, but was secured in its place again without the loss of the oil. Gas was shut off from the town for two nights, I think. This is the first time the town has been without its customary supply of gas since the works were started in 1858. B. F. Africa, Lessee, and Charlie Bates, Superintendent, are hustlers." Mr. Diffenbaugh also informs us that the Tyrone Gas and Water Company will this summer build a new gasholder and make some extensions to the water mains.

Mr. James Lovell Little, formerly President of the Boston Gas Light Company, and one of Boston's prominent merchants, died at his summer residence, Blytheswood, Swampscott, on the morning of Wednesday, June 19, after a short illness. Mr. Little was a native of Marsfield, where he was born April 4, 1810. He went to Boston, in 1825, a poor boy; entered a dry goods store and worked his way up until at the age of 20 he was proprietor of a successful dry goods business on Washington street. He retired from the retail business in 1835, and interested himself in various firms until 1877, among the most prominent of which were Eliphalet Baker & Co., Little, Alden & Co., the Pacific Mills, etc. Mr. Little during his active business life was a member of the reorganized Board of Overseers of Poor, and was Trustee of the Massachusetts General Hospital. He was also President of the Kearsage Mills, of the Middlesex Corporation. In 1843 he married a daughter of the late Zebedee Cobb, and at his demise left five sons and one daughter, Mrs. Grace A. Oliver. For several years past he has been incapacitated, in consequence of his age, from taking active part in business enterprises, but his vigorous mind always appreciated the efforts of others, and his counsel was sought for its keenness and justice.

New Gas Company for Elizabeth, N. J.—It is rumored that an opposition gas company is to be started at Elizabeth, N. J., by New York, Philadelphia and Elizabeth capitalists, the Company to be capitalized in the sum of $100,000. It is also stated that the new Company will prove a formidable rival to the one operating there now. Of this there can be no doubt; and we might also add that that is just what is intended by the formation of most of the opposition gas companies, the desire of whose backers is more particularly for personal benefit than otherwise, while loudly professing to have only the public interest at heart. It will be well for the Elizabeth people to ponder over the fact that opposition gas companies have never benefited those who pay the gas bills.

Opposition Gas Works at Hutchinson, Kas.—We learn that a franchise has been granted for an opposition gas works in the city of Hutchinson, Kansas. The gas works already in operation there has recently changed ownership. The present owner has made arrangements to extend the works and build an entirely new manufacturing plant, and will probably expend $50,000 in improving the works. It is not certain as to whether the party having the franchise for the opposition works will build or not, as the establishment of another company would be the occasion of considerable litigation and delay, the owners of the present works claiming an exclusive franchise which has not yet expired.

Mr. John W. Harrison, President of the Shickle, Harrison & Howard Iron Company, of St. Louis, Mo., sailed on the 22d ult. for an extended trip through Europe.

The Watertown (N. Y.) Gas Company has notified consumers that on and after July 1st the price of gas will be reduced to $2 per thousand to those whose bills are paid within 10 days of rendering.

Deep Gas Wells.

The question of deep drilling in gas wells, in localities where the rock strata are deeply sunk, as they are at New Albany, has caused a good deal of interesting discussion in connection with the theory entertained by some that natural gas cannot be found below the sea level. The latter theory has certainly been disproved in many instances in this country, and it is almost universally disproved in the gas wells of Russia and China, nearly all of which are deep wells, far below sea level.

The Westinghouse well, at Pittsburg, is 4,618 feet deep, over 2,000 feet below sea level. The gas well at St. Catharines, Can., is 4,000 feet deep. The Presque Isle gas well developed a small flow of gas at over 4,000 feet, but at 4,300 feet the tools were lost in the well. The Trenton rock, which always underlies the Hudson River rock in the Lower Silurian, was not struck till the drill reached near 4,300 feet. The big gas strike at Kingsville, Ont., was made at a depth of 3,200 feet, and the company holds the well at $104,000, and will get that for it. At Thorold, Ont., the drill went down to 2,700 feet before gas was struck. At Fort Smith, Ark., where sea level is reached at about 600 feet deep, gas was struck at 2,700 feet, and the well developed a pressure of 250 pounds to the square inch. Near Harrisburg, Pa., are two gas wells, both of which are 3,000 feet deep. At McKeesport, Pa., there is a very productive well that is 2,500 feet deep. The gusher at Dowegiac, Mich., is 2,700 feet deep. The most successful well at Lucknow, Tenn., is 3,000 feet deep.

The Zoar well, an immense gusher, in Cattaraugus county, N. Y., is 3,100 ft. deep. When gas was struck in it at that depth, the volume was so great that the tools in the well, weighing 3,100 pounds, were thrown into the air 300 ft. and the derrick utterly wrecked. There is a very strong and probably well founded probability that a well from 2,300 ft. to 3,000 ft. in depth at or in the vicinity of New Albany would reach the gas reservoir. It is certain natural gas will not be found in quantity to be utilized in this part of Indiana until the Hudson river strata has been passed through by the drill. It is safe to say that every well drilled in New Albany has been stopped in the Hudson river strata, where the drill pump was sending up flour-white accretions.

[A Paper read before the Society of Gas Lighting.]

Utilization of Residual Products.

By C. H. NETTLETON.

In a paper read before the 1887 meeting of the American Gas Light Association, on the "Utilization of Residual Products,"* the writer stated:

"I started in the preparation of this paper with the hope of proving that in most works well managed the residuals could be made to pay 90 per cent. of the cost of the coal carbonized; but here on the seaboard and through New England, with good caking coal costing from $4 to $5 per ton, I have very reluctantly come to the conclusion that most of us must content ourselves with 70 to 80 per cent."

As my statements were considered somewhat visionary at the time the paper was read (if I correctly interpreted the comments which were made), and as I desire to change my statement somewhat, and, more than all, as large stocks of coke are the rule this year rather than the exception, I have ventured to prepare a short paper on the same subject, particularly with reference to the sale of coke, giving in an informal way my experience with residuals since that date; and I hope that though the story be twice told it may be of some interest, and possibly profit, to the members of this Society.

First, as to the change of views. I desire to say that the probability of obtaining from 70 to 80 per cent. of the cost of coal from residuals in most well-managed coal gas works, which I expressed in the paper referred to, I wish to modify so far as this—that I think this is possible only in small works. I have never had experience in the management of a large gas works, and therefore am not in a position to judge accurately of the results that should be obtained; but the fact that a number of large works, though ably managed, are unable to reach these figures, is good evidence that I was wrong in the position I took. With small works, however, I am familiar; and I am confident that on the Atlantic seaboard, with an annual production of not over fifty millions, and under fair average conditions, it is not unreasonable to expect the manager to return to the company 70 per cent. of the cost of the coal, including enriching material, from the sales of his coke, tar, and ammonia water.

In the paper referred to I stated that the receipts by the Company with which I am connected, from the sale of residual products, had been as follows:

Year ending April 1, 1883....	47.8	per cent.	of	cost	of	coal carbonized.
" " 1884....	46.0	"	"	"	"	"
" " 1885....	57.5	"	"	"	"	"
" " 1886....	54.0	"	"	"	"	"
" " 1887....	57.6	"	"	"	"	"

I can now add—

Year ending April 1, 1888....	69.2	per cent.	of	cost	of	coal carbonized.
" " 1889 ...	71.5	"	"	"	"	"

In making up these figures the entire cost of delivering the coke has been deducted. In the first five years the labor of breaking coke was deducted only in part, but in the last two years it has been deducted entirely.

In the first six years no labor was deducted for pumping tar, but in the last year 8 cents per barrel was allowed for pumping each barrel.

All expenses on the ammonia plant have been deducted, except depreciation.

The following figures give the details of the consumption and cost of coal and the receipts from residuals for the past two years:

Cost of Coal and Receipts from Residuals, 1887–1888.

Coal used—Caking		2,893 tons.
Cannel		138 "
		3,031 tons.
Cost of same—		
Cash paid for coal		$14,081 27
Inventory of coal, April 1, 1888	$2,582 79	
" " " 1887	2,302 56	
		280 23
Cost of coal used		$13,801 04
Cash receipts for coke		$7,160 60
" " tar		1,856 53
" " ammonia water		631 77
		$9,648 90
Cash receipts for residuals, brought forward		$9,648 90
Inventory of coke, April 1, 1888	$36 00	
" " " 1887	135 00	
		$99 00
Net receipts for residuals made in year		$9,549 90

Per cent. of cost of coal, 69.2.

No inventory is made of tar, but the quantity on hand April 1, 1888, was larger than in 1887.

Cost of Coal and Receipts from Residuals, 1888–1889.

Coal used—Caking		3,055 tons.
Cannel		144 "
		3,199 tons.
Cost of above—		
Cash paid for coal		$14,620 27
Inventory, April 1, 1889	$2,503 23	
" " 1888	2,582 79	
		79 56
Cost of coal used		$14,699 83
Cash receipts for coke		$7,590 41
" " tar		2,741 22
" " ammonia water		205 67
		$10,537 30
Inventory of coke, April 1, 1888	$36 00	
" " " 1889	9 00	
		27 00
Net receipts for residuals made in year		$10,510 30

Per cent. of cost of coal received, 71.5.

More tar was sold than was made, but all the ammonia made was not concentrated.

	1887–8.	1888–9.
Coke sold (including shrinkage on coke broken)	73,908 bush.	85,977 bush.
Coke sold per ton	24.4 "	26.87 "
Coke broken (includes shrinkage)	21,898 "	33,601 "

I desire to call your attention to the fact that for the first of the two years, the quantity of broken coke was 29 per cent. of the entire quantity sold—and for the second year, 39 per cent.

This sale of broken coke I regard as one of the most important items connected with the sale of residuals at the works in my charge. But for that sale I am confident that I should have had at various times in the past two years large stocks of coke on hand, and in consequence would have been selling at very much lower prices than at present, and by reason of the shrinkage which always comes when coke is stored, the quantity sold per ton would have been less than now.

On the other hand, by reason of this sale of broken coke, in addition to the regular demand for the large size, we have been able to sell the coke as fast as made. For more than two years the yard has been kept practically free, and, in consequence, prices have been maintained, a very fair quantity of coke per ton has been sold, and the results as stated above have been reached.

The manager of a New England works, whose ability I highly respect, made this comment in talking on the subject, that he preferred to have a reasonable stock of coke on hand to provide for a sudden increase in orders.

Except in coal famines, which have been rare in the past, and probably will be more rare in the future, there will be no sudden increase in the demand for coke that cannot easily be filled from the daily production; particularly is this true when the trade supplied is the house trade. It varies at different seasons of the year almost directly as the gas production, and continues along from day to day as regularly as the output of gas. From my experience of the past two years I would not have a stock of coke if it could be avoided.

I have related the story of the method which was finally settled upon to induce people to use coke in their houses so many times that I know you all must be more or less familiar with it, and so will not repeat it now. But I desire to say that two years ago last February the cards giving prices of broken coke were sent out for the first time, and for the year ending April 1, 1888, we received 1,750 coke orders at the office, an increase of nearly 1,400 orders as compared with the preceding year. For the year ending April 1, 1889, we received 2,704 orders. I can also say that the cartage, which is the excess charged above 11 cents per

*See JOURNAL, Nov. 2, 1887, p. 279.

bushel on prices given on the cards*, showed at the end of each year a profit, after paying all expenses.

The population we supply with gas is located somewhat peculiarly, being confined to a territory about one mile broad by four miles long, the gas works being at one end and the larger part of the population at the opposite end of this district. In consequence we are able to reach less than half of the population at the prices quoted. If the works were centrally located so that the entire population could be reached with reasonable charges for cartage, I think there is no doubt but that the sales of broken coke would be doubled.

It may be of some interest to you to hear the following figures, which show the shrinkage and cost of labor and value of product, when broken by hand and machine, the machine being that made by Mr. Keller, of Columbus, Indiana, the broken coke being of nearly the same size in each case:

Broken by Hand Hammers.

200 bushels of large, at 9 cents per bushel		$18 00
Produced 168.33 bushels of small, at 11 cents per bushel	$18 52	
Produced 10.42 bushels of breeze, at 5 cents	52	
	$19 04	
Labor, 8 hours, at 17½ cents per hour	1.40	
		17 64
Loss		36

Broken by Machine.

200 bushels of large, at 9 cents per bushel		$18 00
Produced 164 bushels of broken coke, at 11 cents per bushel	$18 04	
Produced 9 bushels of breeze, at 5 cents per bushel	45	
	$18 49	
Labor, 3 hours, at 17½ cents per hour	53	
		17 96
Loss		04

I trust you will pardon the personal element in this paper. It has been written at odd times, under very great pressure of business, and is not in the shape either in ideas or composition that the writer could wish.

I have presented it to you partly to justify the position I took in a previous paper to which I have referred, and partly to call your attention to one method of disposing of coke which has worked successfully in one place. Reasoning from the few to the many is often fallacious, but in this case I think I am safe in saying that my experience can be duplicated by anyone willing to make the effort.

*The following is a copy of one side of the card referred to:

At the following prices, small coke will be delivered *and binned on any floor* of any building within one mile of gas works:

2 bushels	$0.36	14 bushels	$1 79
3 "	0 51	15 "	1.90
4 "	0.66	16 "	2.01
5 "	0.80	17 "	2.12
6 "	0.91	18 "	2.23
7 "	1.02	19 "	2.34
8 "	1 13	20 "	2.45
9 "	1.24	21 "	2.56
10 "	1.35	22 "	2.67
11 "	1.46	23 "	2.78
12 "	1.57	24 "	2 89
13 "	1.68	25 "	3.00

On the Occurrence of Paraffine in Crude Petroleum.

By E. A. Partridge.

It is well known that the paraffine obtained by the distillation of petroleum residues is crystalline, while that obtained directly (as in the filtration of residuum) is amorphous. Ozokerite or ceresine differs but slightly from paraffine, the principal distinction being want of crystalline structure in it as found. Other characteristics, such as the melting point, specific gravity, etc., vary in both, and so are not of importance in a comparison. Hence it has been asked, is the paraffine occurring in petroleum and ozokerite identical with that which is produced by their distillation? As crystalline paraffine could be obtained from ozokerite by distillation alone, many persons have supposed that it was engendered in the process. Recently, however, crystalline paraffine has been obtained from ozokerite by dissolving the latter in warm amyl alcohol; on cooling the greater part separates out in crystals having the luster of mother-of-pearl. By repetition of this process a substance is obtained that is scarcely to be distinguished from the paraffine obtained by distillation. Apparently there exists, then, in ozokerite, together with paraffine, other substances not capable of crystallization which keep the paraffine from crystallizing. These colloids appear to be separated by amyl alcohol in virtue of their greater solubility in that menstruum. It is also reasonable to suppose that they undergo change or decomposition by distillation.

So as petroleum residues are amorphous, and the crystalline paraffine is first produced by distillation, it has been argued that the paraffine present in crude petroleum is approximately the same thing as ozokerite.

This, however, is not sufficient to establish the pyrogenic origin of all crystallized paraffine, as crystals can be obtained from the amorphous residues by distillation at normal or reduced pressure or in a current of steam. To explain these facts two assumptions are possible. Either the chemical and physical properties of all or some of the solid constituents are changed by the distillation, and the paraffine is changed from the amorphous into the crystalline variety, or the change produced by the distillation takes place in the medium (*i. e.* the mother liquid) in which the paraffine exists. The change effected in ozokerite and in petroleum residues when crystalline paraffine is obtained by distillation, is to be regarded as a purification, and can be effected partially by treatment with amyl alcohol. In the same way, by repeated treatment of petroleum residuum with amyl alcohol, a substance of melting point 59° C. can be obtained which cannot be distinguished from ordinary paraffine.

The treatment with amyl alcohol has therefore accomplished the same results as was obtained by distillation, and the action is probably the same—*i. e.*, a partial separation of colloid substance. These facts point to the conclusion that crystallizable paraffine exists ready formed in both petroleum and in ozokerite, but in both cases other colloidal substances prevent its crystallization. By distillation these colloids appear to be destroyed or changed so as to allow the paraffine to crystallize.

It is a generally known fact that liquids always appear among the products of the distillation of paraffine, no matter in what way the distillation be conducted. This shows that some paraffine is decomposed in the operation.

The name *proto-paraffine* has been given to ozokerite, and to the paraffine of petroleum in contra-distinction to *pyro-paraffine*, the name that has been applied to the paraffine obtained by distillation from any source.

According to Reichenbach, paraffine may crystallize in three forms: needles, angular grains, and leaflets having the lustre of mother-of-pearl. Hofstadter, in an article on the identity of paraffine from different sources, confirmed this statement, and added farther that at first needles, then the angular forms, and then the leaflets are formed. Fritsche found, by means of the microscope, in the ethereal solution of ozokerite, very fine and thin crystal-leaflets concentrically grouped, and in the alcoholic solution fine irregular leaflets. Zaloziecki has recently developed these microscopic investigations to a much greater extent. According to this observer, the principal part of paraffine, as seen under the microscope, consists of shining stratified leaflets with a darker edge. The most characteristic and well developed crystals are formed by dissolving paraffine in a mixture of ethyl and amyl alcohols and chilling. The crystals are rhombic or hexagonal tablets or leaves, and are quite regularly formed. They are unequally developed in different varieties of paraffine. The best developed are those obtained from ceresine. Their relative size and appearance give an indication as to the purity of the paraffine, and, as they are always present, they are to be counted among the characteristic tests for paraffine. Reichenbach observed that mere traces of empyreumatic oil prevented their formation.

The old method of determining the amount of paraffine in petroleum was to carry out the refining process on a small scale; that is, to distill the residue from the kerosene oils to coking, chill out the paraffine, press it thoroughly between filter paper, and weigh the residue. The sources of error in this procedure are manifold; the principal one is the solubility of paraffine in oils, which depends upon the character of both the paraffine and the oil, and also upon the temperature. The next greatest source of error is variation in the process of distillation and the difference between working on the small scale and on the large scale.

In most cases, where a paraffine determination is to be carried out, one has to deal with a mixture of paraffine with liquid oils. Now, paraffine is not a substance defined by characteristic physical properties which distinguish it from the liquid portions of petroleum. It consists of a mixture of homologous hydrocarbons, which form a solid under ordinary conditions. The hydrocarbons of this mixture show a gradation in their properties, and gradually approximate to those which are liquid at ordinary temperatures. It is a well known fact that a separation of these homologues is entirely impossible by distillation. It has also been ascertained that the liquid constituents of petroleum do not always possess boiling points that are lower than those of the solid constituents. This

shows that we have to deal not merely with hydrocarbons of one, but of several series.

When determinations of the amount of paraffine are to be made, then it becomes necessary to specify with exactness what is to be called paraffine. The most definite property that can be made use of for this purpose is the melting point. For several reasons it is convenient to include under this name hydrocarbons of melting point as low as 35°–40° C.

The method proposed by Zaloziecki for the determination of paraffine is the following: The most volatile portions of the petroleum are separated by distillation, until the thermometer shows 200° C. These portions are separated, as they exert great solvent action upon paraffine. At the same time he finds that no pyro-paraffine is formed under this temperature. A weighed portion of the residue is taken and mixed with 10 parts by weight of amyl alcohol and 10 parts of 75 per cent. ethyl alcohol; the mixture is then chilled for 12 hours to 0° C. It is then filtered cold, washed first with a mixture of amyl and ethyl alcohols, and then with ethyl alcohol alone. The paraffine is transferred to a small porcelain evaporating dish and dried at 110° C. It is then heated with concentrated sulphuric acid to 150°–160° C. for 15 to 30 minutes with constant stirring. The acid is then neutralized and the paraffine extracted by petroleum ether. On evaporation of the solvent, the paraffine is dried at 100° C. and weighed. Zoloziecki found, according to this method, in three samples of Galician petroleums, 4.6, 5.8 and 6.5 per cent., respectively, of proto-paraffine. The method was carried out as above, with four samples of American petroleums, Colorado oil from Florence, Col.; Warren county oil from Wing Well, Warren, Pa.; Washington oil from Washington county, Pa.; Middle District oil from Butler county, Pa., all furnished by Prof. Sadtler.

They were very different in physical properties, and in appearance, the Colorado oil being a much heavier oil than the others, and the Washington oil being an amber oil, while the other two were of the ordinary dark green color and consistence. The losses on distillation to 200° C. were very different, being about one-tenth in the case of the Colorado oil, and nearly one-half in the case of the others. The percentages of partially refined proto-paraffine in the four reduced oils (all below 200° C. off) were as follows: for the Colorado oil, 23.9 per cent.; for the Warren oil, 26.5 per cent.; for the Washington oil, 26.6 per cent.; and for the Middle District oil, 28.2 per cent.

The question now arises, what value has this determination of the proto-paraffine which may exist in an oil. As before said, a portion of the paraffine is always decomposed in distillation at temperatures sufficiently high to drive over the paraffine oils, so the yield of pyro-paraffine is always less than the proto-paraffine shown to be present originally. Zaloziecki found this in the case of the several Galician oils he examined. Corresponding to the 4.6, 5.8 and 6.5 per cent. of proto-paraffine in the several oils, he obtained 2.18, 2.65 and 2.35 per cent., respectively, of pyro-paraffine.

For the present, however, the extraction of proto paraffine on a large scale by means of such solvents as amyl and ethyl alcohols is out of the question on account of their cost. A distillation, under reduced pressure and with superheated steam, would, however, prevent much of the decomposition of the original proto-paraffine and increase the yield of pyro-paraffine.

Insurance Regulations as to the Use of Fuel Oil in Philadelphia.

The Special Committee of the Philadelphia Fire Underwriters' Association, appointed on May 31 to formulate a set of regulations respecting the use of fuel oil in that city, and the insurance hazard of the same, presented the following report—it was adopted by the Association and its provisions are now in force:

Your committee, appointed for the purpose of examining into the use of oil for fuel, beg to submit the following report:

We find there is a growing desire on the part of manufacturers to test the quality of this character of fuel, both for producing steam and for the general use of fire heat in furnaces and forges. Among the glass workers, oil has been used in the "glory holes," and, as stated, successfully as regards economy, and in the metal workers it is used as the source of heat in forges, rivet furnaces, and in tempering.

As far as this city is concerned, oil has been but little used for producing steam, and from the data that the committee have, they doubt if it will be used for this purpose. Comparing this form of fuel with coal, the coal is the cheaper of the two, and it does not appear to the committee that there is any immediate probability of the oil being delivered in this market at a lower price than that at which it is now sold. In making a comparison of the cost in producing steam, we find that the heat-producing power of oil is about 50 per cent. greater than either hard or soft coal, but the cost of the fuel shows oil to cost four times more than coal. If this be taken as a criterion, the use of oil is an extravagance, which will be determined in its use.

For these reasons, we think that oil will be but little used for producing steam.

Among the metal workers and the glass works it is reported that there is an economy in the use of oil, as well as an advantage in its use over coal fires.

After a full discussion of this subject, your committee feel that the use of oil should only be allowed under strict regulations, and that the interests of the underwriters demand that its use should be discouraged as much as possible. The experimental use of oil, to determine if it would apply to certain risks, we entirely oppose, for the reason that in cases of this kind the arrangement is inclined to be a careless one, and an unquestionable increase to the prevailing hazard of the risk. We recommend that no privilege be granted for experimental use. The different parties who erect burners and appliances for burning oil, must have some reasonable argument commending their particular appliance that is based on results from the use of oil for fuel, and if these arguments are well founded, they should be willing to establish their plant as a permanent affair, safely arranged, and in accordance with such reasonable regulations of the insurance companies as may be required.

We feel that the dealers in the oil burner should be willing to guarantee their plant as being able to accomplish what is claimed for it, and, if this can be done, we think that none but a permanent plant, properly arranged, should be allowed. The use of a careless temporary system is accordingly opposed.

As to the methods of storing and handling the oil, we find that it is the desire of the companies that all oil should be under ground, and the use of what would be termed a gravity system of feed to the burner prohibited. Accepting this, we have moulded our suggested rules to embody this feature.

We would also call attention to the various oils which are offered to the manufacturers for the purpose of fuel under the names of fuel oil, crude oil, residuum, etc., many of which are extremely volatile, giving off explosive and combustible vapors at low temperature, and dangerous, therefore, to both life and property; and while we believe that oil may be used for fuel and with perfect safety, yet the quality of the oil and the arrangement of the burners and position of the storage tank should be under the supervision of this Association, and would further suggest that the use of oil for fuel be prohibited in all risks in this city until the system to be employed be first approved by the Association and the work inspected by one of our inspectors.

There is one requirement that your committee regard as imperative, and that is that the use of oil shall be prohibited in the thickly built portion of the city. We recommend that the oil used shall be tested from time to time by the inspectors.

We have submitted the following rules for the regulation of use of oil, which are offered for adoption:

Rules for the Government of the Use of Oil for Fuel.

The following rules shall regulate the use of oil for fuel in risks under the jurisdiction of the Philadelphia Fire Underwriters' Association:

Tank.—All oil shall be contained in a tight, iron tank of not over 25 barrels capacity, which shall be located under ground, at least 2 feet below the surface of the ground, and shall be so situated that the top of tank shall be below the level of the burner.

It shall be provided with a filling and vent pipe. The tank shall not be within or under any building, and its location shall be decided by the Association. The tank shall not be located in a vault.

Oil.—Fuel oil or prepared oil which shows a satisfactory flash test will be approved. No oil shall be allowed on the premises except in the storage tank, or properly stored.

Method of Using Oil.—It is provided that either of the following methods may be used under these rules:

1. Oil tank underground; air-pump run by power, pumping an air pressure to the top of the tank, so arranged as to raise the oil to the level of the burner. Safety-valve on the air pipe that will open at 5 pounds, thus keeping the maximum air pressure at 5 pounds.

2. Oil tank underground; small pump sucking from the tank and delivering to a small pipe in the boiler room or at furnace; this pipe to have an overflow pipe running back to the storage tank.

In the use of this arrangement it is intended that there shall be but a small supply of oil above ground. The burners are to be so arranged that they will draft from this pipe.

Valves.—Proper valves are to be arranged to control the oil, and in no case larger than ½-inch opening to the burners.

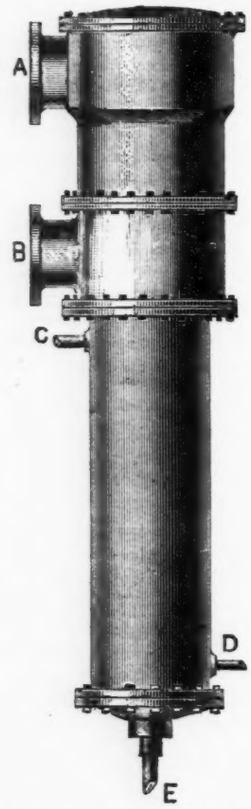
In summarizing the rules that we would suggest, they would be as follows:

1. All oil to be underground.
2. Gravity system of feed prohibited.
3. All oil used to show satisfactory flash test.
4. Each system to be approved by the executive committee.
5. No oil to be used for fuel until the risk has been examined and reported upon by the surveyors, and submitted for approval to the executive committee.
6. The secretary to issue a notice to the members, describing the method adopted in each risk using oil for fuel.

The New Maxim Patent Gas Carburetor.

The new form of Maxim carburetor is now attracting much attention in England, where a working plant of this type has been installed at the factory of the Nordenfeldt Gun and Ammunition Company, at Erith, England. *Invention*, in reverting to the experience at Erith with the Maxim apparatus, says:

Most of our readers are, no doubt, aware that this is an apparatus for enriching all kinds of coal and other gases by means of gasoline vapor. There have been a host of carburetors brought out on the market during the last 40 years, but hitherto all have failed in one way or another. We know that it is possible to raise the illuminating power of ordinary coal gas to a high cannel gas standard by the addition of hydrocarbon vapor, but the problem has not yet been thoroughly solved. Until very recently the price of gasoline was so high as to prevent it being largely used for that purpose, with any degree of economy, but its present price has been an inducement to many, to again try to make use of it as an enricher. The majority of systems hitherto have failed to recognize that the chief necessity was to add to the gas a uniform supply of the enriching vapor, no matter what the rate of consumption, and to attain this end by such means as to prevent any waste. For an apparatus to effectually work, it is necessary that the flow of gas should not be allowed to take up more than the necessary quantity of vapor, which means that the rate of evaporation should always tally with the flow of gas. In fact, taking it for granted that it is worth while to carburet gas, we must find the means of doing it which shall cause at the burner a mixture of constant illuminating power which can be entirely burnt by the ordinary burner without smoking, and without leaving a deposit in the service pipes under any variations of temperature. From experiments made in our presence at the factory of the Maxim-Nordenteldt Gun and Ammunition Company, at Erith, we found that the enriched gas contained 12½ per cent. less impurities per cubic foot than coal gas, and 2 cubic feet of enriched gas give the same amount of light as 7.6 cubic feet of coal gas, the gasoline being a perfectly pure material, the amount of noxious vapors given off is only 25 per cent. There is also less heat, the flame being much steadier, the gas being burnt under a greater pressure.



In the sketch given *A* is the enriched gas outlet, *B* the coal gas inlet, *C* the steam inlet, while *D* is the steam outlet, and *E* the gasoline inlet.

The details of this really praiseworthy machine have been carefully worked out by Mr. Frank W. Clark, who is well known as a gas engineer, and we must admit that it is by far the most complete of any yet introduced.

Mr. Corbet Woodall, M.I.C.E., in making a report on it, states, that, during the time he was making experiments at Erith, he found that after the machine was once adjusted, no difficulty was experienced in maintaining the quality of the enriched gas to from 39 to 40 illuminating candle-power, and that the machine would require no attention, if worked continuously for weeks. He also says: "I was agreeably surprised to find that there was no appreciable difference in the illuminating value of the gas close to the machine, and at the most remote parts of the premises, after it had traversed long lengths of pipe, both under and above ground. The syphons or receivers upon the lines of pipes were carefully examined, but no accumulation of gasoline was found in them, although gas enriched to about 40-candle had been regularly used for several weeks. The quantity of gasoline used in order to keep the quality of the enriched gas to 39 candles by the illuminating power meter was 4.38 gallons per 1,000 feet of ordinary gas. The volume of the enriched gas was greater than that of the ordinary gas by 13.9 per cent., because of the introduction of the gasoline vapor." The following, taken from Mr. Woodall's report, will show what the process can do: "The ordinary uncarbureted gas, with an illuminating power of 16 candles per 5 cubic feet, or thereabouts, as tested with the standard Argand, gives a light of 1.66 to 1.74 candles per cubic foot when burnt in the ordinary open burners most suitable for factory and general use. Burnt at the rate of 2.08 cubic feet per hour in a similar but smaller burner, the carbureted gas gives a duty of 6.68 candles per cubic foot, that is to say, 2.08 cubic feet gives more light than 7.6 cubic feet of uncarbureted gas burnt under similar conditions. This gain is secured by the consumption of 4.38 gallons of gasoline per 1,000 cubic feet of gas. Taking the cost of gas at 3s. per 1,000 cubic feet, and of gasoline at 1s. per gallon, this result represents a saving to the user of 44 per cent. The dearer the gas, of course, the greater the saving; gasoline being constant in price. Thus, at 5s. per 1,000 cubic feet the saving from the use of the enricher would be 57.2 per cent.; and, conversely, with gas at 2s. 6d. per 1,000 cubic feet the saving would be reduced to 37.1 per cent. The cost of steam or hot water has not been reckoned, but that is infinitesimal. The apparatus is suitable to large works, factories, institutions, or warehouses, using many lights, and the patentees guarantee an actual saving of nearly 50 per cent. on the usual gas bill, which is colossal."

The machine at Erith occupies a corner of the boiler house, being connected close to the outlet of the meter. It is bye-passed, because carbureted gas is not required by the day in the works. It stands about 5 feet high, and is 13 inches diameter outside, presenting much the general appearance of a large injector or a steam jet exhauster, being a cast iron cylinder of slightly different diameters in its successive vertical chambers. This machine is capable of carbureting at least 1,000 lights, and actually serves 7,000, scattered all over extensive shops and offices. The lowest chamber contains a copper cylinder, called the retort. This holds the gasoline, which flows into it by gravity from a reservoir placed in a shed outside the buildings, and is at such a level as to maintain the fluid at about half the height of the retort. The retort is surrounded, when the apparatus is working, by steam or hot water, the heat of which vaporizes the gasoline. The vapor rises through a series of baffle plates in the upper portion of the retort, and escapes into the next chamber, which contains a gasholder sealed in mercury, and intended to act as a mixing vessel for the gas and gasoline vapor, and a regulator of their proportions. The way in which the gas is carbureted to any desired degree of richness is exceedingly simple.

The holder works on a vertical central spindle passing through a tube open to the gasoline retort below but ending at the top in a "stuffing-box fit," which does not permit any appreciable passage of gasoline vapor so long as the holder is grounded. As the gas passes into the holder through a suitable pipe it, of course, rises and carries its central spindle up with it. This spindle is cut away in four longitudinal chases, which deepen with its length of travel, so that the higher the holder rises the more gasoline vapor rushes into it through these chases

in the spindle. Consequently the vapor enters from below and mixes with the gas in the holder, and the compound finds an exit through a number of holes in the upper portion of the side of the holder—the holes being so disposed that the more draught there is upon the gas outlets the more of them are exposed above the mercury. The holder acts as a governor as well as a mixer, as, supposing the steam to be turned on to the retort when there is no gas passing into the holder, the latter will not rise at all. When gas is allowed to enter, the holder rises, and at the same time admits the proper proportion of gasoline; and no matter how much the holder may rise or fall, in consequence of variations in the draught, the proportion of gasoline vapor to gas is always the same.

We were greatly pleased with the tests made.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, June 10th, 1889.

The Gas Institute.—Board of Trade Returns.—Mr. Foulis on Water Gas.—The Late Mr. Spice.—Little Clouds.

The annual meeting of the Gas Institute is arranged to open on the 18th prox., one week later than usual, on account of Whitsuntide. As may be anticipated, the proceedings this year are looked upon with an extraordinary degree of interest. The list of papers to be read is of limited character, as the various matters to be discussed may be expected to fill up the greater portion of the time. The special business includes the election of a complete set of new officials, with the exception of three members of the Council whose term of office has not expired; a resolution for abolishing the class of extraordinary members, and inquiring more rigidly into the qualifications of other classes of members than has hitherto been the rule; and a complete remodelling of the rules. Therefore, the time that will remain for the reading and discussing of papers will be short. In view of the number of distinguished gas engineers who have felt it their duty to retire from the Institute, including the whole of the executive, with the exception of six members of Council, the chief interest centers around the list of members at the present time as compared with last year. At the commencement of the 1888 meeting the roll call comprised 22 Honorary, 606 Ordinary, 60 Extraordinory, and 31 Associate members, together with 104 Associates. At that meeting 24 new names were added, and 26 struck off for nonpayment of subscriptions, so at the close of the meeting the total number was 821. I give this number as compared with that at present existing:

	1888.	1889.	Loss.
Honorary Members.....	22	20	2
Ordinary "	606	529	77
Extraordinary "	60	56	4
Associate "	31	31	—
Associates.....	102	84	18
	823	720	101

This 101 includes the names of 10 gentlemen deceased during the year, so the actual number of those who have retired is 91. This number includes many who are deservedly recognized as flowers of the profession, whose names have been regarded as ornaments to the roll book, and whose familiar presence would always be as warmly greeted at future Institute meetings as it has been in the past. The question upon which they have seen fit to retire lays between them and a very small section of the members, so that the majority will undoubtedly regret their absence. Whilst granting all this, however, it would be an insult to the remaining 720 members to write up "Ichabod" over the door of the Gas Institute. They naturally wish that the Institute should be represented in every town in England, and especially that its members should include the principal gas engineers of the day. But still the secession of 12 per cent. of the members is not a sufficient reason for winding up the whole thing, and the fact that the example set by the retirement of the late President and three-fourths of the executive has not been followed to a greater extent, seems to warrant the expectation that a decided expression of opinion on this point may be looked for at the forthcoming meeting. Of course, it remains to be seen whether any supporters of the late President and his friends have prepared to retain their membership, thus securing an opportunity of speaking and writing on the subject. It may or may not turn out at the meeting that an important section of the members are in favor of winding up the Institute, though I anticipate a large majority in favor of carrying it on. At the close of the meeting a party of the members will visit Paris, in response to an official invitation received from the *Societe Technique de l'Industrie du Gaz en France*. It is to be feared that the close proximity of quarter-day will prevent this party from being so large as might otherwise be the case.

An important critical notice and searching investigation of the Board of Trade returns relating to gas undertakings, including those belonging to local authorities as well as private companies, is now appearing in the London *Journal of Gas Lighting*. It might be supposed that these returns, being issued under the authority of Parliament, would be rigidly accurate and reliable. While it would be too much to expect that such a mass of figures should be perfectly free from error, one would think that the publication would bear marked evidence of careful and strict supervision in compilation. A perusal of the article in the *Journal* will at once show that those who indulge such an expectation will be doomed to disappointment. Instance after instance of incomplete returns, which in a matter of this sort are worse than no returns at all, are cited; in many cases the proportion between capital and revenue as stated in the returns, verges on the absurd. So it is extremely desirable that before referring to these official papers for information on any important matter, the *Journal* article should be consulted on the subject. The average expenditure of capital per ton of coal carbonized per annum is about $30.75, or $3.30 per 1,000 cubic feet of gas sold. The annual receipts average 26.17 per cent. on the capital, and of this 18.09 per cent. is required for expenses, leaving 8.08 per cent. as profit. As compared with each ton of coal carbonized, the receipts are $7.95, the expenses $5.50, and the profit $2.45; or, per 1,000 cubic feet of gas sold, the receipts average 85 cents, of which 60 cents go for expenses and 25 for profit. It is remarkable that the difference in the amount of profit per 1,000 cubic feet of gas sold is very small, as between private companies and local authorities. In the former case it is 27½, and in the latter 23 cents. So that very little practical benefit results to the consumer by the gas works passing from the hands of the trading company to the local authority.

Anent my remarks on water gas, which appeared in your issue of May 27th, last, some quotations from a report by Mr. W. Foulis, ex-President of the Gas Institute, and Manager of the Corporation Gas Works at Glasgow, may be cited. The report was prepared at the request of his Committee, and includes full details as to the method of manufacturing water gas, gathered by personal examination and inquiry. Mr. Foulis is satisfied that it could not be supplied on a practical scale at less than 42 to 48 cents per 1,000 cubic feet. Looking at the fact that a much larger quantity of it must be used, as compared with coal gas, to produce an equivalent effect either in lighting or heating, there is evidently not much margin for it in respect to economy only, to say nothing of its poisonous character and other objections. Mr. Foulis states that carbureted water gas as supplied in America, would be far more costly than coal gas in England; and concludes by expressing the opinion that in this country under present circumstances, water gas, crude or carbureted, cannot compete with coal gas either in respect to efficiency or economy, for the general purposes of a town supply. Such is the condition of affairs here, but of course this does not touch upon the position of the question in the States, where prices of materials, wages and other matters are very different.

It is with much regret that I record the death of a gentleman celebrated as a gas engineer in England, and also not unknown to American Gas Associations. Mr. Robert Paulson Spice died on the 11th ult., at the age of 75. He was President of the British Association of Gas Managers in 1876–7, and was largely instrumental in inaugurating the benevolent fund which was commenced during his year of office, and now amounts to about £1,600. About that period he made a determined effort to secure the perfecting of water gas in a commercial sense, and erected apparatus for working it on a commercial scale. After that he took up the St. John and Rockwell condensing and carbonizing apparatus, and within the last few years he has been known as an ardent supporter of the Cooper coal liming process. It will be remembered that he wrote a book ostensibly on gas purification, but really with the object of recommending and advertising this process. He was a lessee of several gas works, particularly in the early part of his career, when it was a very general custom to lease gas undertakings to anyone who would guarantee a fixed dividend on the capital. As a parliamentary witness he had no equal, and his large experience in the construction of gas works rendered his advice on all matters of valuation, transfer of gas works to local authorities, important extensions, etc., of great value. In his designs he did not neglect the ornamental, and some of the apparatus erected from his plans, notably that at Tunbridge Wells, possessed an airy elegance that was also characteristic of his speeches and writings. As a debater he possessed great power of repartee, and this coupled with native good humor and easy expression, rendered him a powerful antagonist that few cared to tackle.

Kindly, genial, and benevolent to a fault, he was highly esteemed by

all who knew him, and his decease is regretted by a circle of friends extending far beyond his ordinary business connections.

One or two small clouds are disturbing the serene atmosphere of our industry. There is a prospect of a general rise in the price of coals. Besides that, the railway companies have been at considerable pains in securing a general re-arrangement of their charges for goods traffic, and to say the least, the result of this will not be any reduction in the charges for carrying coals. So that the coal charges for next winter will certainly run much higher than they did during the past season. Then a determined attempt is being made in London and a few other towns to form a union amongst gas stokers and other laborers, with a view of forcing up the rates of wages usually paid. On this head there is not much to fear, because any important increase in the charges for wages would at once render it advisable to introduce machinery. Drawing and charging machines are said to compare favorably with present wage rates, and have been adopted in consequence at several works; any increase of wages would of course place them in a more favorable position, so it is probable that the makers of this class of machinery look with complacency upon any agitation amongst the men.

Hearing on the Question of Fuel Gas at Waltham, Mass.

The following in reference to the matter of supplying fuel gas to the residents of Waltham, Mass., is from the *Daily Tribune*, of that city:

A meeting of the Committee on Streets was held in the Aldermen's committee room last evening to listen to the report of the experts secured by the Waltham Gas Company to fully investigate the merits of the Loomis plan for furnishing fuel gas. The Gas Company went first to the bat to take their innings, and scored many runs, and are still not out.

Mr. A. M. Goodale was the first speaker for the Waltham Gas Company, and no one could help being convinced after hearing his remarks that the Gas Company was perfectly honest in this matter, and had done all that any corporation could do to ascertain whether or not it would be a good thing to introduce at present the Loomis gas; for if it is, they want to do it; and if it is not, they do not want a rival company to lay pipes simply to make a gas war in this city. The Gas Company has taken measures, no doubt, to secure a fair report, from the fact that they secured no less a person than Robert Young, the well-known expert on natural, fuel and other gases, and who is now Gas Engineer and Superintendent of the Allegheny Gas Company, who writes as follows:

ALLEGHENY GAS WORKS,
ENGINEER AND SUPERINTENDENT'S OFFICE,
ALLEGHENY, PA., May 31, 1889.

G. A. STEARNS, ESQ.:—Dear Sir—Yours of the 28th inst. came to hand and contents noted. My advice to you is not to spend any money in the fuel gas business at present; that is, outside of what you can do in the way of introducing your illuminating gas for fuel. You can sell it just about as cheap, for the amount of heat it will produce, as any fuel gas you can make. It is not a question of cost per thousand cubic feet to the consumer, but how much will it cost me to do the heating and cooking in my house compared with coal? We must find some other method for heating our houses before fuel gas will be adopted for general use. You might get a few who would be willing to pay you the price you would require to get for it; but there is no use going into the business unless you are sure you can sell the gas at a price very little more than it would cost for coal to do the same amount of work. I have given the fuel gas question considerable study, and so far, even with the experience I have had with natural gas, I have not been able to convince myself that I can make a fuel gas and deliver it to consumers through the city and sell it at a price that would justify them in using it for all purposes in place of coal, and make it a financial success for the company. So if you are determined to put up a fuel gas plant, you will have to apply to someone else, for I could not advise you to go into a business or put you to any expense until I would have some hope of success.

Yours truly,
ROB'T. YOUNG, Eng. and Supt.

Then Mr. Goodale stated that it had been published in the Boston papers as an advertisement, that the Bay State Gas Company had bought the Boston Gas Light Company and others, and intended acquiring the Waltham Gas Light Company, and in order to secure as conservative an expert as possible, the Waltham Company had engaged no less a person for an expert than a gentleman closely connected with the Boston Gas Company, which, of course, is a part of the Bay State Company, and at a great deal of expense was able to give the report of that gentleman, who had been to Jackson, Mich., to investigate. Here is his letter:

OFFICE OF THE BOSTON GAS LIGHT COMPANY,
No. 24 West street.
BOSTON, June 14, 1889.

ARTHUR T. LYMAN, ESQ.: Dear Sir—I have been requested by you to give my opinion upon the advisability of the Waltham Gas Company's undertaking the distribution of fuel gas.

In reply I would say that the subject is so interesting a one to the gas engineers of the country that it would give many of them great pleasure to see the experiment tried in Waltham, but it would be impossible for me to recommend it to you, and at the same time to point as an example to any other city in the country in which the business of distributing manufactured fuel gas is being carried on successfully and at a profit.

The towns which are so fortunate as to lie in the natural gas district, enjoy so much comfort and cleanliness as compared with those which do not, that there has been much discussion and calculation during the past few years as to the possibility of the profitable manufacture and distribution of gaseous fuel. It has the great advantage of making no smoke, ashes or dust; it can be turned off or on at once as the temperature of the outside air rises or falls, and really makes so much difference in the work of a reasonably sized house, as to generally enable a housekeeper in Pittsburgh to dispense with the services of one servant.

Many people consider it as one of the questions of the immediate future, and it is not impossible that at no distant date an experiment in that direction may be tried in Boston. At present, however, there is only one city in the country, and that not a large one, in which the believers in fuel gas have had sufficiently the courage of their convictions to induce them to go regularly into the business. The city of Jackson, Mich., to which I allude, is a prosperous western city of about 25,000 population. It is lit by coal gas, Edison incandescent light, 233 arc lights, and the Fahnehjelm incandescent burner. It is needless to say that a most active competition is going on for customers, and that lights of all kinds are sold at rates which do not show much profit. Arc lights for all night lighting being $88.00 a year; incandescent electrics as low as 30 cents a month; coal gas from $1.75 to $1.35 a thousand, and fuel gas 50 cents a thousand, with discount to 30 cents if 5,000 feet a month are consumed. It is obvious that competition is overdone and that money is being lost. It is however claimed by the fuel gas company that they are making a living, and that if they can double their business they can make a handsome profit. Of this they are confident, and are preparing to increase their plant at considerable expense. While the coal gas company sends out an amount of gas not far from 30,000 a night, the fuel gas company sends out 180,000. They have steadily increased their business from the first, not of course retaining every consumer, but always increasing their meters. They sent out 300,000 feet of gas a day last winter. They have nearly 500 consumers and most of the principal people are giving the gas a trial in some shape, heating, cooking or lighting. For furnaces, it cannot be economically used against anthracite at $6 a ton, it being about one-third more costly. For two of the purposes mentioned—heating and cooking—it is better to use the apparatus specially designed for the purpose, but it is possible with some alterations to make use of the gas in ordinary stoves and ranges. If the gas is allowed to burn freely in a pit below the flow, supplied with air through another opening in the room it is then easy to heat a large room very rapidly. Considerable moisture, however, is formed and I do not regard that method of using the gas as wholly satisfactory.

A large proportion of the gas, though it is impossible to say how large, is, however, used in lighting, and I was told that 4,000 Fahnehjelm combs were in use. These are made of magnesium in the shape of a comb, with a metal back, and suspended over the gas when lit, and when heated give out their light by incandescence. They are very friable and are worn away by the heat. They will not last over 100 hours, which means practically that when much used they require to be changed about once a week. As to the character of the light, there is considerable difference of opinion. It is almost perfectly white, with a slight bluish color, and looks dim when compared with the bright yellow tint given by gas or the Edison light. There is no doubt, however, that a room can be lit more cheaply in this way than by any other means; but that it would be generally popular amongst people who could afford any light but the cheapest, I cannot think. It is true that I was told of one well-to-do gentleman who was obliged to put the burners all over his house after trying them in a room, because his family all insisted on reading by them. I was also shown some brilliantly illuminated rooms in Chicago, but, personally, the light was not an agreeable one, nor do I think it would be to many. The gas itself is made from soft coal, which is put into ordinary retorts, and about three quarters of the gas contained in it is distilled off as in the common process of coal gas manufacture, the other quarter being allowed to go to waste. The coke is

then drawn directly into a generator situated directly in front of the retort bench, with its top at the level of the floor, and is made into water gas by alternately blowing it up to active incandescence and then decomposing steam. The bench of retorts is heated with crude oil, which is more than paid for by the tar made during the distillation of gas, so that all the coke is left for the production of water gas. The resultant compound would be made five-sixths of pure water gas, and one-sixth coal gas to the extent of about 36,000 feet of gas to a short ton of coal. It would contain hydrogen, carbureted hydrogen and carbonic oxide, and would have about 400 heat units to a foot if properly made through a sufficiently deep bed of fuel. Sometimes when this becomes too low, a quantity of carbonic acid is made which greatly interferes with the heating power of the gas, and consequently with the light given off by the burners. It is also found that if a larger proportion than one-sixth of coal gas is allowed to enter the mixture, there is a deposit formed upon the comb which seriously interferes with its value.

It will thus be seen that the business of supplying gaseous fuel is not absolutely new, and that one city is reaping the advantages of an experiment. It is also to be introduced into Grand Rapids, Mich.

If the Waltham Gas Company should see fit to undertake the work, I am inclined to believe that a more convenient process could be obtained, by the use of which both water and producer gas could be made, and the producer gas used to displace a large amount of the coal now burned under the boiler used for your electric plant. At the same time, so long as a new method of doing any work whatever has not yet attained the position of earning dividends, it can only be regarded in the light of an experiment, and I cannot say that I have sufficient faith myself in its continued pecuniary success in Waltham to warrant me in advising you to undertake the business.

There are, however, many people whose views are different, and if your Company should undertake the enterprise, I should watch its progress with great interest, and should be greatly pleased to find that I had taken too conservative a view of the profits likely to be realized either in Jackson or in Waltham.

Yours respectfully, MALCOLM S. GREENOUGH.

Mr. Goodale continued by saying while there was no doubt of the success of the Loomis plan for isolated purposes, it had not, up to the present time, proved the success that would warrant investors in spending their money to experiment with it for places the size of Waltham. Mr. Cross, counsel for the petitioners, had said that the Waltham Gas Company could put in the plant $50,000 cheaper than any other company, so if any other company was permitted to put it in, they would start with $50,000 water, which must have interest and dividends paid on it, and who was to pay these but the consumers? The Directors of the Waltham Company had been trying to get a meeting with Mr. Cross, so as to get facts and figures, but to no avail.

So far as securing a location to prove the success of the Loomis gas was concerned, they had been granted the opportunity at South Framingham, where there is no other company to compete, but beyond getting a charter to put in the plant and laying pipes, nothing has been done but to issue stock and print an elaborate pamphlet, and had proved that they were not sincere in what they had proposed to do. Now the Bay State Gas Company that advertises that they propose to secure the Waltham Gas Light Company as a part of their combination, either mean to buy the plant or else they do not mean to buy it, and there is no better way to buy a company's stock cheaply than to have a rival company given permission to locate, and as Mr. Cross, counsel for the petitioners, is the right-hand man of Mr. Addicks, the head of the Bay State Gas Company, it certainly looks as though the scheme for acquiring the Waltham Gas Company stocks, was by those means.

A. T. Lyman, Esq., explained that the Waltham Company had done all in its power to secure perfectly fair testimony from the experts; for if the Loomis plan was worthy of introduction they wanted to know it. The Company had secured important testimony at considerable expense, and had concluded not to invest in fuel gas at present.

Sherman Hoar, Esq., counsel for the Waltham Gas Company, read a letter which was in answer to questions propounded by him relative to the Framingham Company, and the answer, which was from a prominent citizen of Framingham, was to the effect that the Fuel Gas Company had done nothing further than to secure their charter there, that having been granted them on the 10th of last September. Bradshaw Tolman, one of the petitioners for the Loomis plant, who was present, was asked to say something in favor of the petition; but he stated that he had nothing to say in its favor at present; but upon being urged he said that everything did not look right to him. He wanted to do all that was promised, but was afraid that he could not do it, from the fact that Messrs. Jackson and Whitney had withdrawn from the petition simply from the fact that they thought that Mr. Loomis was not acting fairly in the matter; they all knew full well that Mr. Cross was closely connected with the Bay State Gas Company, and it looked like a scheme of Mr. Loomis' to aid that Company in getting a location in Waltham, or at least a charter for a plant. No written contract could be obtained from Mr. Loomis that he would give the other petitioners the sole right to introduce and maintain his plant in Waltham, and all the contract they had was verbal, and there was nothing to prevent Mr. Loomis from turning the Company over to the Bay State Company after a charter had been secured, and it certainly looked that way to the other petitioners who had withdrawn and washed their hands of the whole business; he stated that he had written to Mr. Loomis, asking some questions about the matter, but had received no answer. Mr. Tolman said that it had been hinted that Mr. Loomis had some connection with Mr. Addicks in the matter, and he was not prepared to say that it was not so. He further stated that when he went into the matter it was with perfect good faith, and had hoped to have things go along all right, but unless he could get some satisfactory answer from Mr. Loomis before the next meeting of the Aldermen, and a written contract, then he would certainly withdraw. A number of questions were asked of Mr. Tolman by the Committee, but no new points were brought out, and when the hearing closed everybody present could not help thinking that Waltham had just escaped a dose of the Bay State Gas Company.

The newspaper above quoted from also contains the following editorial comments:

"The developments at last night's hearing before the Committee on Streets regarding the fuel gas question go far to show that in reality the Bay State Gas Company is seeking a chance to follow its policy and absorb the local company. Whether in the end this would not be beneficial is not at this time a matter of argument; but the fact that instead of gaining a title by right of purchase, under fair conditions, they seek to obtain a chance to lessen the goods they want, obtaining by means of the fuel gas petition a franchise of value never to be used except for that purpose, is sufficient to place that petition in such a light that its entire withdrawal will be only a matter of course. It is of course natural that the Waltham Gas Light Company would seek to procure evidence in favor of its argument, and had the Company been even less successful than it was, still the wisest course to pursue by the committee in charge would be to recognize the fact that the gentlemen opposing the petition are substantial business men, whose interests are identical with those of the city, and who, having ample capital, if the fuel gas theory be correct, are best fitted to undertake the venture."

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

NOT long ago we had occasion to report a shipment of the famous Breckenridge gas cannel to the gas works at Barcelona, Spain. Messrs. Perkins & Company, agents for this cannel, now advise us of a recent shipment (450 tons) from New Orleans to London, which was followed by the consignment of another cargo (600 tons) to Genoa, Italy. They are at present engaged in loading 600 tons, to be despatched to San Paulo, Brazil. Truly, the Breckenridge seems to have the world for a market.

THE proprietors of the London (O.) Gas Light Company propose to test the legality of the contract recently entered into between the authorities and the local electric light company in respect to the public lighting.

THE Board of Gas Trustees appointed about a fortnight ago to supervise the construction of the Hamilton (O.) municipal gas works have organized by appointing Robert Allstatter to the Presidency. Wm. Smyers was chosen Secretary, and will receive $40 per month for his services. An economical beginning, at any rate.

THE retort house of the Portland, Oregon, works is being enlarged and improved. We believe that the benchwork addition is to consist of 7 beds of 6's. This does not look as if the Company's proprietors had much doubt about the future in store for the light of the present.

IN our last we published the remonstrance offered by the Manitoba Electric and Gas Light Company against the proposed plan of incorporating the Northwest Electric Light Company. About a fortnight ago the Deputy Attorney General for the Provincial Government rendered a decision, in which he held that as, according to his opinion, the remonstrants' charter did not entitle them to exclusive rights, letters of incorporation should be granted the Northwest Company.

THE City Council of McKeesport, Pa., have awarded a contract for the lighting of the streets by means of arc lamps (2,000-candle power, on a partial moontable schedule) to the McKeesport Light Company. The rate is to be $100 per annum each, and it is estimated that 36 lamps will be sufficient.

THE Michigan Legislature has indorsed a measure providing for the reincorporation of gas companies, the charters of which have expired by limitation.

THE Directors of the Worcester (Mass.) Gas Light Company have increased the annual dividend rate to 8 per cent. The old rate was 6 per cent.

THE Philadelphia Company, which will be recognized as the largest purveyor of natural gas in the Pittsburgh region, has published the following notice: "The Philadelphia Company takes pleasure in announcing to its patrons that after a long series of costly experiments, it is now prepared to furnish natural gas to domestic consumers by meter; acknowledged to be the fairest, safest and most economical method of buying and selling this product. Owing to the many kinds and sizes of houses supplied, and to the constantly changing conditions under which the gas is used, and of which it is impossible to take account, it has long been evident that no other plan than the exact measurement of the gas actually consumed could be devised which would be entirely equitable and satisfactory. Several grave difficulties, however, stood in the way of its earlier adoption. The higher pressure at which natural gas is used, as compared with illuminating gas, and the greater volume required per minute for fuel purposes, as well as the different nature of the gas itself, demanded a meter not only unquestionable in point of accuracy, but also of very substantial construction, and, consequently, of greater cost than any heretofore in use. The meter now being manufactured expressly for the Philadelphia Company is the result of extended experiment and successfully solves all the problems presented. It is constructed of the best materials, for a pressure far beyond what it can possibly be called upon to resist, and each meter will be tested by and bear the official stamp of the City Meter Inspector." We understand that each meter, of the smallest capacity used costs the Philadelphia Company $20, and that the wear and tear on the natural gas meter will be far in excess of the same item devoted to the measuring of illuminating gas. As was to be expected, the Company's change of base has aroused the antipathy of the gas consumer, who claims that the procedure is simply instituted through the desire of the Company to fleece him completely; but sellers of illuminating gas are not wondering much over the change, since it was long ago predicted by them that the sale of natural gas by meter was merely a question of time and the inevitable result of a better knowledge of the conditions governing the business. One decidedly ludicrous point in connection with this departure of the Philadelphia Company is to be found in an explanation furnished by an official of prominence in its management. This gentleman said: "We do not intend to compel any person to use a meter, but will not furnish gas to consumers who will not allow us to put one in." A good many of the consumers in the district thought they held contracts for fuel gas that would hold for a year, but this hope was speedily dissipated by a critical examination of the documents, which showed that the contracts could be annulled by either party on 30 days' notice.

THE Gardiner (Me.) Council has adopted the proposition of the Kennebec Light and Heat Company to perform the public lighting under the following conditions and terms: To maintain 22 arcs (2,000-candle power variety), between dusk and midnight of each night, and to keep alight, at 4 prominent points on water street (the main thoroughfare of the town) 4 gas lamps, to carry 4-feet burners, from midnight to daylight, for the sum of $1,690 per annum, the contract to run for 5 years from July 1, 1889. All additional arc lights that may be ordered are to be furnished at the rate of $75 each per annum.

"AN attack of economy has beset the City Fathers of Ansonia, Conn., who have determined to order the extinguishment of the arc lights that have been maintained, the interregnum to terminate on October 15. The gas lamps are rather far apart under the present conditions in Ansonia, and the question as to who should light and extinguish them, now that it became necessary to put out the arcs, was a burning one in the town. The Council suggested that Chief of Police Nolan would fill the bill, and that official was politely requested to turn lamplighter. He peremptorily declined the task, and accompanied his declination with the remark that he thought he was doing enough just now in consideration of the money that was being paid him out of the treasury—$50 per month. By the way, I would not be far out of the way in saying that Connecticut is not over liberal in the matter of expenditures on municipal account—particularly, perhaps, in the item of salaries.—HADDAM."

FUEL gas was not by any means an unknown quantity in New England, even as far back as 1848, which fact is recalled through the main laying operations now being carried on by the East Boston (Mass.) Gas Company, which is replacing some 3-inch pipes on Maverick and New streets. The pipes that are being removed were the first ones ever laid in East Boston, having been buried in 1848 by the Noddle Island Gas and Iron Company, whose gas plant was on Havre street, between Maverick and Decatur. The iron plant was on New street, at the foot of Maverick, and the pipes spoken of were laid between both works for the purpose of furnishing the latter with fuel.

THE following is the text of the bill amending the title of the Board of Gas Commissioners of Massachusetts: "*Chapter* 373.—An Act to change the name of the Board of Gas Commissioners: Be it enacted by the Senate and House of Representatives in general court assembled, and by the authority of the same, as follows:

"*Section I.*—The board of gas commissioners shall hereafter be known and designated as the board of gas and electric light commissioners."

"*Section II.*—This act shall take effect upon its passage."

The measure was approved on May 28.

THE Boston (Mass.) *Beacon*, in an article on the "Boston Gas Consolidation," prints the following: "The Bay State Gas Company as at present constituted is bonded and capitalized as follows: $7,000,000 first 5 per cent. gold bonds, $3,000,000 second 5's, $2,000,000 7 per cent. income bonds and $5,000,000 stock, making a capital of $17,000,000. The Boston, Roxbury, South Boston and Dorchester Gas Light Companies are all controlled by the Bay State Gas Company. The original capital of the Boston Gas Light Company was $2,500,000, divided into 5,000 shares, par $500. Some of this stock sold in 1888 at $1,250 per share, or $6,250,000 for the entire property. The Bay State paid for the same $6,000,000. The original capital of the Roxbury Gas Light Company was $600,000, divided into 6,000 shares, par $100, and the stock sold in 1888 at $200 per share, or $1,200,000 for the entire property. The Bay State paid for this stock the sum of $1,250,000. The South Boston Gas Light Company, capitalized at $440,000, 4,400 shares, par $100, selling in 1888 at $115, or on the basis of about $500,000, was purchased by the Bay State for $600,000. This purchase also embraced all of the stock of the Consumers Company, with its rights in this vicinity to certain water gas patents. The Dorchester Company, original capital $400,000, in 4,000 shares, par $100, stock selling in 1888 at $125 per share, was taken by the Bay State Company for $500,000. The Bay State, gas plant was estimated by the English experts at $2,500,000, and was turned over to the consolidation at that figure. It thus appears that the five different gas plants against which these $17,000,000 of securities are to be issued represent to the Bay State Gas Company a purchase price of $10,850,000. Every subscriber for $1,000 to the Boston Gas Syndicate will get his *pro rata* share of assets of the syndicate remaining in the treasury upon the closing up of its affairs. This allotment will amount probably to not less than $1,000 second 5's, $133.33 income 7's and $666.67 stock, a total of $1,800 for $1,000. The fixed charges for the new company, that is, the interest on the first and second mortgage bonds, amount to $500,000 per annum. Adding $140,000 for interest on the income bonds, and the interest requirements foot up a total of $640,000 per annum. The net earnings of the four old companies now combined in the Bay State for the year of 1888, according to the Gas Commissioners report foot up $696,000, made up as follows: Boston, $500,000; Roxbury, $120,000; South Boston, $41,000; and Dorchester, $35,000. While the present managers are very reticent about earnings, it is safe to predict as a reasonable increase this year: Boston from $500,000 to $650,000; Roxbury, $120,000 to $150,000; South Boston, $41,000 to $50,000, and Dorchester from $35,000 to $50,000. This would give earnings for 1889 of upwards of $900,000, as against $696,000 in 1888. Deducting $640,000 total interest requirements as above, leaves $260,000 for the stock, or more than 5 per cent. on the entire $5,000,000. The Chicago Gas Company, with a capital of $45,000,000, pays 4 per cent. beginning June 1, and only furnishes 40 per cent. more gas than the Bay State Company. At the time of the consolidation, the Boston Gas Light Company had in its treasury from $400,000 to $500,000 cash. The Roxbury company had $275,000 cash in the treasury, and the Dorchester $60,000 cash, all of which went to the Bay State Company. The capital of the Bay State Company ($17,000,000) is not excessive when one considers the capitalization of the Chicago Company at $45,000,000."

THE proprietors of the Morristown (N. J.) Gas Company will construct a new gas holder on its property at Water and Spring streets.

THE consolidation of the Light, Heat and Power Company, of Nashua, N. H., and the Nashua Electric Light Company, will be completed on August 1st.

EX-MAYOR BURDICK, who is interested in the Union Company's proposed attempt to divide the gas supply of Watertown, N. Y., says that the plant will be located at once, "all legal formalities having been completed." Perhaps so, Mr. Burdick.

WE regret to report the death, on Wednesday, June 19th, of Mr. William Tompkins, who had been Superintendent of the Batavia (N. Y.) Gas Light Company. He was a well known business man, and was much esteemed in the community.

ABOUT a fortnight ago Councilman Rohan, of St. Louis, introduced a bill in the City Council to authorize the St. Louis Subway Company, as assignee of the National Subway Company, to lay and maintain gas pipes in the excavations, made under the provisions of the ordinance for laying conduits, the gas to be used for fuel and illuminating purposes. The bill sets out that for the gas so furnished the Company shall be empowered to charge not in excess of $1 per 1,000 cu. ft. for illuminating gas, and 50 cents per 1,000 for fuel gas, and that prompt payment (5 days from presentation of bills) shall secure to the consumer a rebate of 5 per cent. The illuminating article is to have a minimum lighting value of 18 candles. The St. Louis Subway Company is to file its penal bond, in the sum of $50,000, before accepting the terms of the ordinance. This probably is the outcome of the dickerings that have been under way for some time between certain St. Louis parties and a Washington (D. C.) syndicate, in which Senator Gorman, of Maryland, is said to be interested.

THE contract for putting in a hydraulic elevator (26-ft. lift) at the works of the Detroit (Mich.) Gas Light Company has been awarded to the Whittier Elevator Company, of 306 Eleventh avenue, New York city.

ONE of the recent contracts secured by the Laclede Fire Brick Manufacturing Company, of St. Louis, Mo., is for the erection of two benches of 6's for the Evansville (Ind.) Gas and Electric Light Company. The furnace to be employed is of the Murray-Mitchell type.

AMONG the betterments in progress at the works of the Knoxville (Tenn.) Gas Light Company are the erection of a new retort house and a new purifying house. Through retorts (6's) are to be placed in the new retort house, with hydraulic main on one side—the plan being similar to that employed at the Detroit Company's works. The bench construction has been entrusted to the Parker-Russell Mining and Manufacturing Company, of St. Louis, Mo. The benches are to be heated by half-depth regenerator furnaces.

CONTRACTS for lighting the streets, public places, etc., of Camden, N. J., have been awarded as follows: Camden Gas Light Company, $19.80 per lamp per year; Pennsylvania Globe Gas Light, naphtha lamps, and keeping same in repair, $22 per lamp per year; Camden Lighting and Heating Company, arc lights, 40 cents per night; incandescent lights, $25 per year.

THE citizens of West Carthage have decided that they do not want electric lighting—not this year, at any rate. The question was determined by special election on June 21. West Carthage is a village of Jefferson county, N. Y.

THE Tarrytown (N. Y.) Union Electric Light, Heat and Power Company filed certificates of incorporation June 21. Capital, $20,000.

THE Citizens Gas Light Company, of Quincy, Mass., has made application to the Council for a discontinuance of the present contract, under which the Company lights, extinguishes and cleans the lamps, etc.; and in its stead makes the proposition to furnish gas at 85 cents per month per lamp, lamps to be supplied with 5-ft. burners, and lighted from dark to midnight, on moon schedule. The request was referred to the Committee on Lights.

THE North Adams (Mass.) Gas Light Company announces a reduction of 15 cents. per 1,000 in the price of gas. The new rate goes into operation on the 1st inst.

THE Lynn (Mass.) Gas and Electric Company will shortly make an addition of 10 feet in width to the entire length of its present building on Pleasant street. The increased room will amount to about 500 square feet. When this addition is finished a 400-horse power compound Corliss condensing engine is to be put in; also a 200-horse power McIntosh & Seymour condensing engine. The larger engine will be used for running the all-night lights, and the smaller one for railroad work. With what engines the Company now possess, the total registered power will amount to about 1,200-horse power—enough for all present needs, and some reserve power in case of accident.

The election for officers at the annual meeting of the Ipswich Gas Light Company, held June 11, resulted as follows: Directors, Joseph Ross, D. M. Tyler, Theo. F. Cogswell, William G. Brown, and Edward F. Brown. Joseph Ross was chosen President, and Wesley K. Bell Clerk and Treasurer.

THE vacancy occasioned by the retirement of Hon. John B. Cotton from the Presidency of the Lewiston (Me.) Gas Light Company has been filled by the election of Mr. Wallace H. White. The office of Treasurer is to be occupied by Mr. Edward C. Lee, *vice* Mr. Samuel T. Bodine.

WORK is rapidly progressing on the extensive additions and improvements to the plant of the Huntsville (Ala.) Gas Light Company. The additions embrace a new holder of 80,000 cubic feet capacity, which, with the old holder, will afford accommodation for the total storage of 100,000 cubic feet. The new purifying house is equipped with new and enlarged apparatus of the latest pattern. Altogether the alterations in the works will enable the management to increase the sendout up to 250,000 cubic feet per day—the present ability of the plant being about 50,000 feet daily. That the full capacity of the improved works will soon be demanded is evident, for the list of consumers and the liberality of consumption is rapidly growing. The merits of the gas stove for culinary purposes are being energetically presented to the residents, and the self-evident advantages of this means of cooking will not only add to the comfort of the domestic circle, but will also lead to a considerable item of revenue to the Company.

SAN PAULO (one of the oldest cities in Brazil, having been founded in 1554, and now having a population of some 25,000) has a Gas Company many of the shareholders of which are located in England. The last half-yearly report to the stockholders is summarized as follows by the Secretary, Mr. James Heath, and contains a number of interesting items:

"The profit and loss account shows a balance to its credit of £9,199 2s. 8d., and the Directors proposed to pay, on 17th inst., a dividend at the rate of 10 per cent. per annum for the half year to 31st December last (free of income tax), which will absorb £5,000, to place the sum of £3,000 to renewals and contingencies account, and to bring the balance of £1,199 2s. 8d. forward to the present half year. The increase in the price of freightage to Brazil, notified in the last report, has been maintained. During the half year 16 additional public lamps were fixed, and the number of private consumers was augmented by 254. The enlargement of the carbonizing plant will be shortly commenced; the works are in their customary efficient state. The Provincial authorities having again announced that the Company's contract expired in December last (instead of in 1897), the most energetic measures will be taken, if necessary, to protect the Company's privilege, but the Directors trust that an amicable conclusion of the question may be shortly arrived at. H. A. Cowper, Esq., retires from the Board by rotation, and offers himself for re-election. The Auditor, Wm. Cash, Esq., also retires, and offers himself for re-election."

THE suit brought by the Standard Gas Light Company, of Long Island City, for $250,000 damages against Wm. Steinway, the piano manufacturer, which has been on trial for some days before Judge Daly, of the Court of Common Pleas, and a jury, came yesterday to an abrupt termination in a dismissal of the complaint upon the ground that there was no proof of fraud. Magnus Gross, Ward R. Parker and Wm. E. De Kraft, the complainants, charged Mr. Steinway with having fraudulently induced them to turn over to him the plant and properties of the Standard Gas Light Company for a nominal consideration, upon his promise to advance money to pay off its indebtedness and then reorganize the Company. They alleged that, instead of carrying out his agreement, Mr. Steinway transferred the entire property to the East River Gas Light Company. They claimed $250,000 damages.

A SHORT time ago the statement was made by St. Louis newspapers that certain electricians had consummated a scheme for the establish-

ment of an electric lighting and power plant in the town of Rich Hill, Mo. That such report was erroneous is shown by the following: "Rich Hill, Mo., June 20.—The report sent out from here to the effect that our City Council had passed ordinances granting a 20 years' electric light franchise to an electric railroad, the city guaranteeing 5 per cent. interest on $50,000 therefor, reflects on the intelligence of our Mayor, who is a lawyer, and the Board of Aldermen, who are some of our leading business men. It is too well known to citizens of Missouri that our Constitution prevents municipalities granting aid to railroads, and that City Councils of the fourth class have no authority, without ratification by the taxpayers, to grant franchises involving the credit of the city for a term of years. The whole business is simply a huge joke, but might injure our city among strangers not knowing the facts. Our city is elegantly lighted with gas and supplied with a system of water works."

THE works of the Warren (R. I.) Gas Light Company will not be removed from their present location on the west side of North Main street; for a special town meeting, called at the request of 40 electors, to consider the propriety of causing the Company to vacate, resulted in a victory for the Company. The question, after argument, was put, and the outcome was that the Company was allowed to retain their present site (which belongs to the town), by a vote of 129 to 13.

DIRECTOR OF PUBLIC WORKS WAGNER, in speaking of the increased facilities of the Philadelphia Gas Works, is reported as saying that the works are now capable of manufacturing from 18,000,000 to 19,000,000 cubic feet of gas daily, and are in a position to sell gas to consumers outside the corporate city limits. The consumption now is 6,000,000 cubic feet per day, while during the winter it increases to 12,000,000 and 14,000,000 cubic feet. The average sendout is 10,000,000 cubic feet daily. Mr. Wagner says that the force of men at the works is being steadily reduced by the use of new and improved labor-saving machinery. When he first took charge there were 3,200 men on the roll, while now there are about 1,500. He thinks the receipts from the sale of gas will be less this year than last, but the expenses will also be much less. He made over $750,000 last year from the works, and expects to do as well this year, notwithstanding the growth of electric lighting throughout the city.

AN injunction proceeding has been filed in the Rush Circuit Court against the city of Rushville (Ind.), the Edison United Manufacturing Company, and the Buckeye Engine Company, by the Rushville Gas Company, to prevent the city from issuing bonds to pay for the electric light plant recently put in operation there. The points raised by the petition are, first, that at a meeting of all members of the Council when the contract was made, three members, or one-half of the Council, refusing to vote either for or against the ordinance, and the Mayor declaring the ordinance passed, that there was no majority vote in favor of the ordinance. Second, that the city, under the law, has no power to buy and own the electric plant. The fight promises to be a bitter one.

THE petition of the Woonsocket (R. I.) Gas Company, asking the right to erect poles and string wires for the supply of electricity, has been granted.

AN effort is being made at Le Roy (N. Y.) to form an electric light company to use the Edison incandescent system. It is proposed to consolidate the local gas company with the new organization, so that either gas or electricity may be furnished as desired. The capital stock, provided the combination is effected, will be $40,000, represented in part by the gas company's plant.

AT a recent meeting of the Charleston (S. C.) Gas Light Company, Mr. John C. Simonds was elected a Director, to fill the vacancy caused by the death of Dr. Andrew Simonds. A semi-annual dividend of 75 cents per share was declared.

ARTICLES incorporating the Nebraska Gas and Fuel Company have been filed with the County Clerk at Omaha (Neb.). The members of the Company are Casper E. Yost, Edgar M. Morsman and Eugene P. Newhall. An attempt was made by these gentlemen some months ago to form a similar company, without success. The Company will operate in Omaha, and the capital stock is $500,000, divided into 5,000 shares at $100 each.

JUDGE BAKER ended, as far as he is concerned, the Gas Trust case by entering a final order on the morning of June 24. This was done by agreement of the attorneys. The Attorney-General elected to submit the case on the demurrers to the pleas as amended. These demurrers decide in favor of the Gas Trust's claim to the right to combine, by purchase or otherwise, the franchises granted to separate corporations. The Attorney-General prayed an appeal to the Superior Court, which was granted.

AT the annual meeting of the Exeter (N. H.) Gas Light Company the following officers were elected: Directors, Messrs. F. H. Odiorne, Samuel Hatch, A. M. Copp and A. P. Brown, of Boston, and Wm. Burlingame, of Exeter; President, F. H. Odiorne; Treasurer, A. M. Copp; Clerk, A. F. Cooper. The showing in the affairs of the Company for the past year was highly satisfactory.

MR. C. W. TILLINGHAST, one of the Directors of the Troy Gas Light Company, is our authority for saying that a meeting of the stockholders of that Company has been called for July 1. The terms of office of the present Directors expire on that day, and the capitalists who have acquired a controlling interest in both the Troy Gas Light and the Citizens Gas Light Companies will at that meeting elect the officers who shall succeed the present ones.

WE have with regret to chronicle the death, on the 16th inst., of Mr. Joseph B. Cardasry, one of Athol's (Mass.) most prominent citizens. Mr. Cardasry took up his residence in Athol in 1858, and engaged in the manufacture of furniture, which business he continued until his death, though at various times he devoted himself and his time to the furthering of public interests. He could never be persuaded to accept a public office, and was widely known as an energetic, methodical business man. For a number of years he was Treasurer and Superintendent of the Athol Gas Light Company, and was one of the large owners of its stock. He leaves an extensive and valuable estate to his wife and daughter, Mrs. Sidney Mann, of Orange, N. J.

THE Town Council of Westerly, R. I., has contracted with the Westerly Gas Company for an increase of 5 arc, and 7 incandescent electric, lights over its previous order of 20 arcs and 125 incandescents. This makes a total of 25 arcs and 132 incandescent lights. Progress toward the early completion of the plant, though not as rapid as might be desired by impatient residents, is nevertheless carried on at a fairly good pace. The new Westinghouse compound engine and a 700-light Westinghouse alternating current dynamo have already been set and are ready for duty, but all the poles have not yet been erected. In fact two car loads of poles have been on a siding for several days, but could not be received on account of their poor quality. The Company has now given a contract for poles to another firm, and the work will undoubtedly soon be pushed to a finish.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

The Points at Issue.

NATIONAL GAS LIGHT AND FUEL COMPANY,
218 LA SALLE STREET, CHICAGO, June 21, 1889.

To the Editor AMERICAN GAS LIGHT JOURNAL:

Replying briefly to the communication from Messrs. Henry Pratt & Co., published in your issue of June 3, we would say that most of the statements which they take so much trouble to prove were never denied by us, or, to our knowledge, by anyone else. They have no bearing whatever upon the question at issue. In 1882—before this Company was formed—the Peoples Gas Light and Coke Company, of this city, purchased of Mr. T. G. Springer the right to build and operate gas apparatus under the Springer patents. Both Mr. Pratt and Mr. Ryan were at that time in the employ of the Peoples Gas Light and Coke Company, and Mr. Pratt, as Superintendent, did very likely superintend the manufacture of the tile, as stated by Mr. Hicks. Nor is there any question about Messrs. Pratt & Ryan having taken out a combination patent on a certain style of arch. There are many ways of laying the superheater brick. They secured a combination patent on a peculiar series of arches, any departure from which invalidates the patents. They might have taken out a dozen such patents without affecting the question at issue, which is: Can they use our Springer cupola, which is fully covered by letters patent, in order to utilize their patent arch? To illustrate: Would the attaching of a patent steam whistle to one of our cupolas entitle the owner of said patent steam whistle to build and operate the cupola itself? We think not. However, the case is in the courts and will soon be decided. Very truly yours,

NATIONAL GAS LIGHT AND FUEL COMPANY,
C. D. HAUK, General Manager.

The Market for Gas Securities.

The market for city gas shares has been without feature during the week, unless a drooping tendency may be taken for such. Still, as the same remark applied to the market for the past three weeks, the featureless judgment would seem to hold good. Consolidated at 87 (the market price at noon of June 28) is very tempting. In Brooklyn shares there is nothing of importance. The annual meeting of stockholders in the Union Gas Light Company will be held tomorrow, and probably the result of this will prove the entering wedge in the impending working over of Brooklyn's gas properties. The Miami Valley Bank (next highest bidder to N. W. Harris & Co., of Chicago, on the block of bonds offered by the city of Hamilton, O., for the purpose of raising funds for the construction of a municipal gas works) has followed the lead of the Chicago house in refusing to take the securities at its bid. The Hamilton people may have trouble yet over their pet project. Eastern gas shares are greatly in demand.

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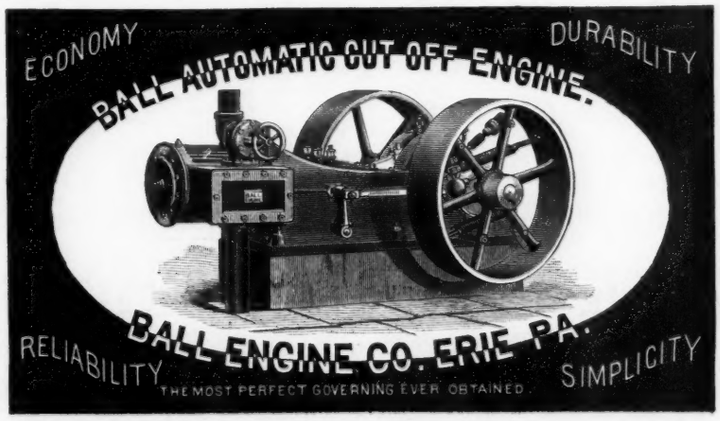

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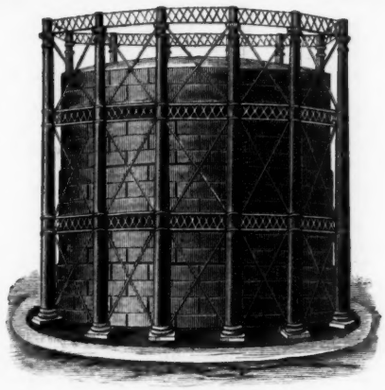

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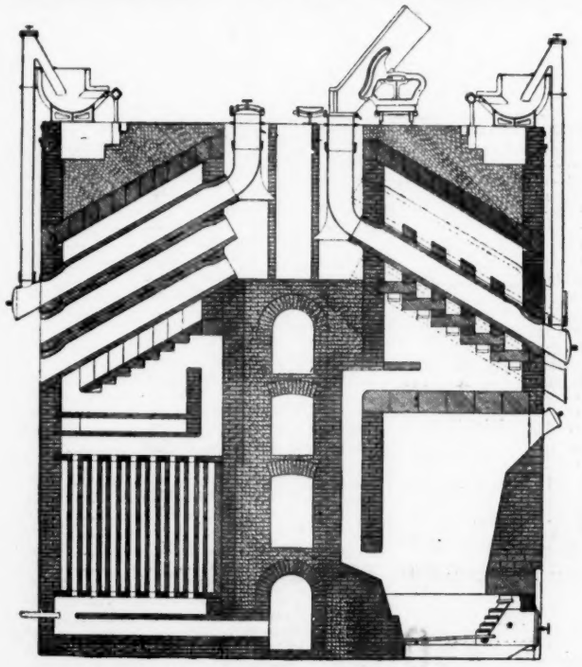

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Amsterdam	1,500,000
"	1,500,000
Annaberg	200,000
Arcachon	100,000
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Altoona, U.S.A.	350,000
Buxton	250,000
Bradford	1,000,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,000,000
"	1,000,000
"	3,000,000
Bremen	150,000
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"	1,000,000
"	1,000,000
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Bishops Stortford	150,000
Blackpool	400,000
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"	1,250,000
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"	1,250,000
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" "	1,500,000
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Cadiz	300,000
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Dover	750,000
"	1,000,000
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Denton	500,000
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" "	1,000,000
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"	500,000
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"	2,000,000
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Falmouth	150,000
Frankfort	300,000
Farnworth	400,000
Fenton	400,000
Friedenshutte	500,000
Furth	400,000
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Goole	250,000
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Kingston-on-Hull	400,000
Kidderminster	750,000
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"	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	2,500,000
"	2,500,000
Silvertown	1,000,000
Bromley	2,000,000
"	1,500,000
"	1,500,000
"	1,500,000
"	2,000,000
"	1,500,000
Shoreditch	2,500,000
Pancras	1,500,000
"	1,500,000
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Nine Elms	3,000,000
"	3,000,000

South Metropolitan Co:—

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Woolwich	400,000
Vauxhall	3,000,000
"	3,000,000
Lea Bridge	300,000
West Ham	1,500,000
Leeds	2,000,000
"	3,000,000
"	3,000,000
"	3,000,000
"	3,000,000
"	2,000,000
Leominster	150,000
Leiden	560,000
"	600,000
Liverpool	2,000,000
"	2,000,000
"	2,000,000
"	2,000,000
"	2,000,000
"	3,000,000
Lincoln	1,000,000
"	600,000
Lowell, U. S. A	1,000,000
Louisville "	1,500,000
Long Eaton	500,000
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"	450,000
"	750,000
"	250,000
"	250,000
Luckenwalde	330,000
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Lyons	1,500,000
Maidstone	1,000,000
Marseilles	1,500,000
"	1,500,000
Mons	500,000
Malines	250,000
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"	1,500,000
"	1,500,000
"	1,500,000
"	1,500,000
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"	2,500,000
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"	1,750,000
"	1,750,000
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"	1,000,000
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"	2,000,000
"	1,000,000
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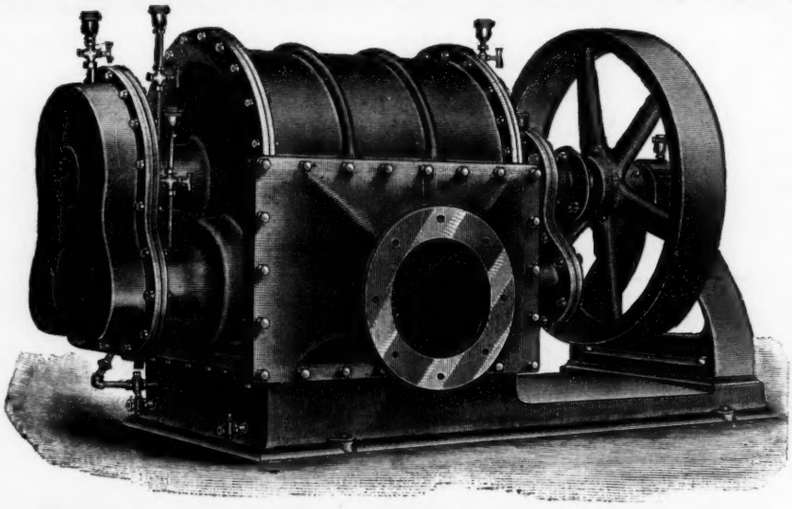

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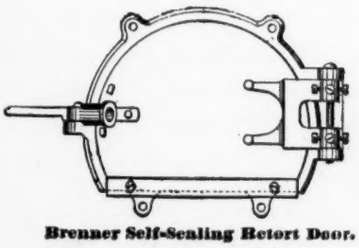

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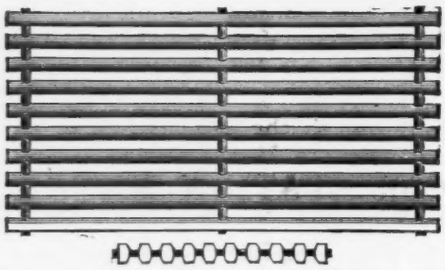

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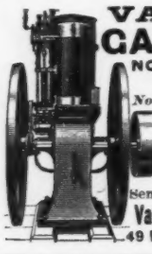

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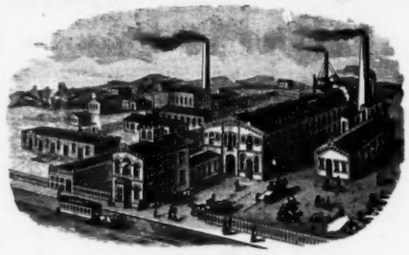

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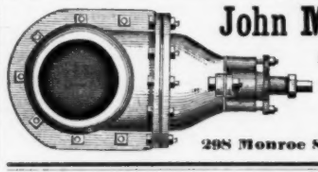

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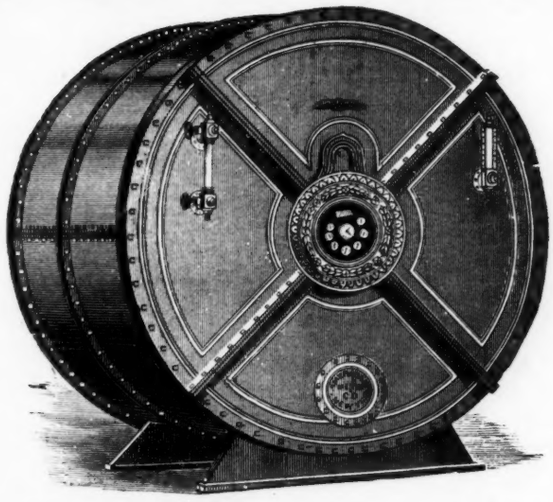

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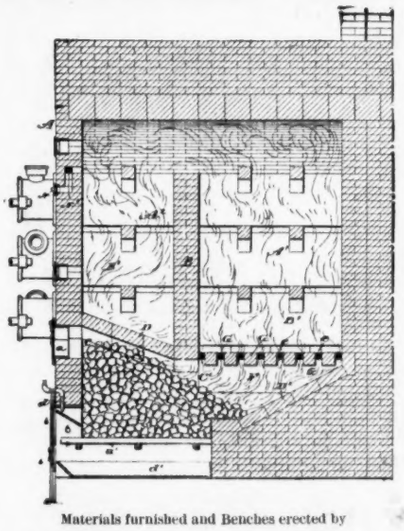

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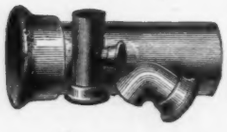

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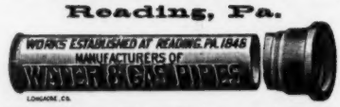

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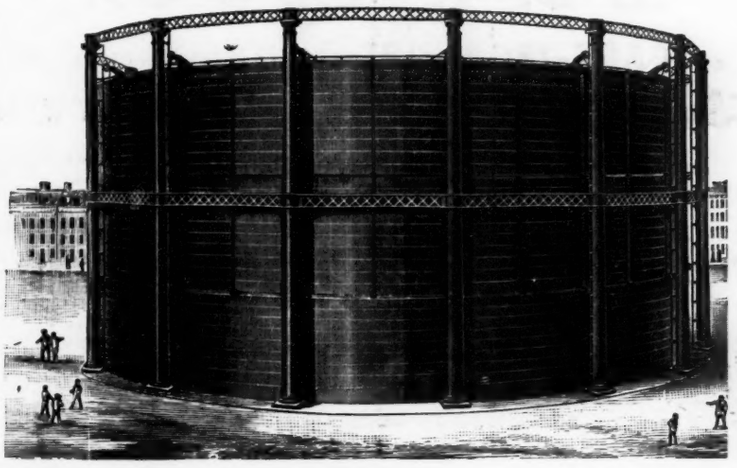

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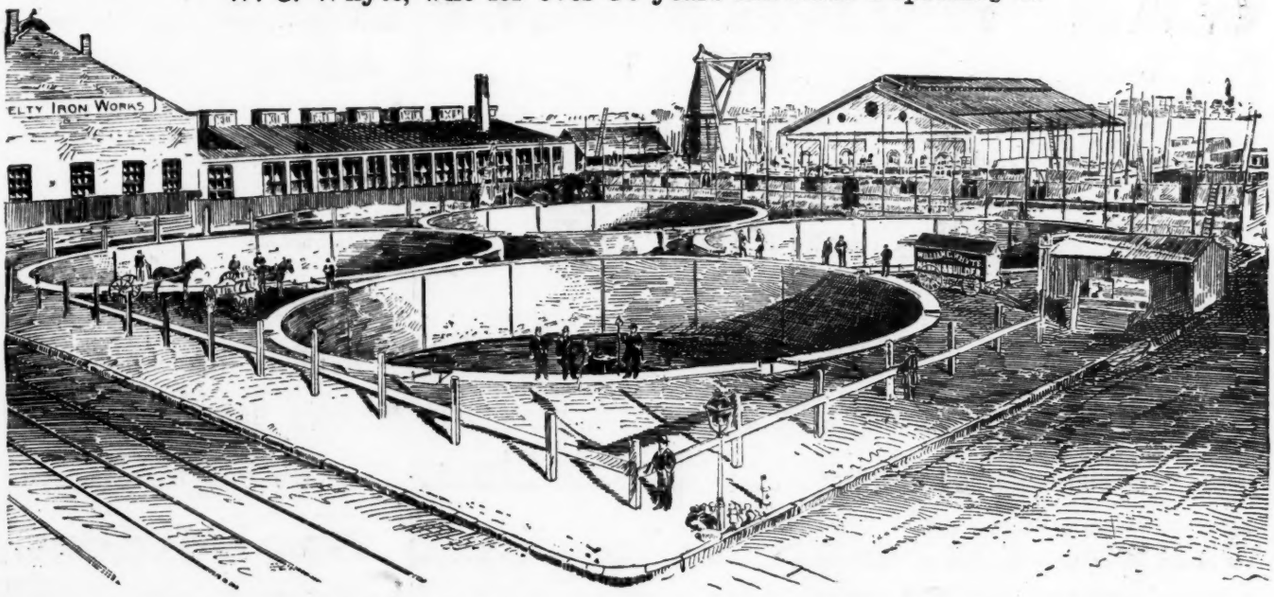

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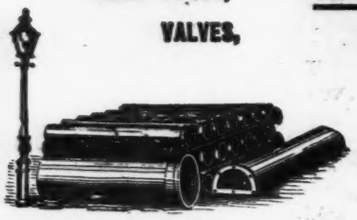

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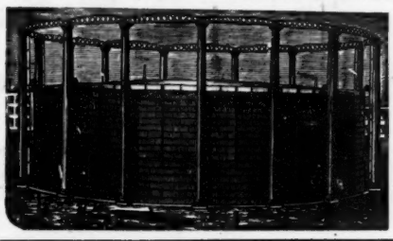

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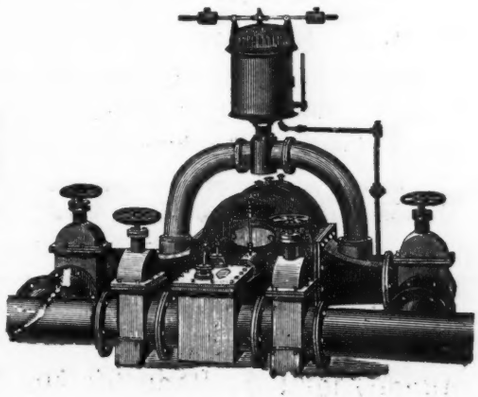

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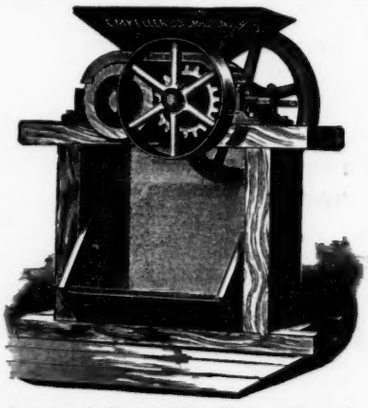

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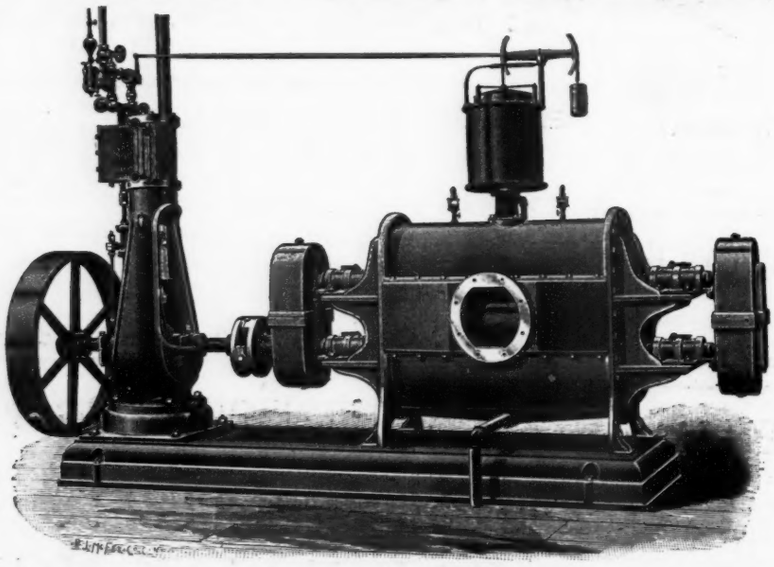

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In Theory the Otto Gas Engine realizes 18 per cent. actual work out of number of heat units in fuel consumed, while the ordinary steam plants reach but 12 per cent. **In Practice** a comparison of cost in dollars and cents between gas and steam power stands as follows (the figures below being taken from actual experience):

50-H.P. STEAM ENGINE AND BOILER, Running a Plant of Fifty 2000-C.P. Arc Lamps 12 Hours.	
4,500 lbs. Indiana nut and slack, at $1.30 per ton	$2 93
Engineer, one night, at $50 per month	1 67
Trimmer, one day, at $40 per month	1 33
Superintendent or Electrician, one day, at $50 per month	1 66
Waste, etc., one day, at $20 per year	05
Water rent, one day, at $40 per year	11
Wheeling coal and removing ashes, at $4 per week	58
100 pairs carbons, at $18.50 per 1000	1 85
One pint cylinder oil, at 60 cents per gallon	07
One quart engine and dynamo oil, at 50 cents per gallon	13
Total	$10 38

50-H.P. OTTO GAS ENGINE, Running a Plant of Fifty 2000 C.P. Arc Lamps 12 Hours.	
9,200 cu. ft. gas, at 42 cts. per M. (for cost of gas see items below)	$3 86
Engineer not needed; engine is in care of Electrician or Supt.	....
Trimmer, one day, at $40 per month	1 33
Superintendent or electrician, one day, at $50 per month	1 66
Waste, etc., one day, at $20 per year	05
Water rent dispensed with (cooling water used over and over)	....
Handling of coal included in cost of gas	....
100 pairs carbons, at $18.50 per 1,000	1 85
One pint cylinder oil, at 60 cents per gallon	07
One quart engine and dynamo oil, at 50 cents per gallon	13
Total	$8 95

Expenses of depreciation, repairs, and interest omitted, being considered the same in both cases—though depreciation and repairs are much higher with steam on account of boiler and its appurtenances. Cost of gas in the holder we estimate for most of the Middle and Western States as follows: Coal, 30 cts.; labor, 20 cts.; purification, 2 cts.; total, 52 cts. Less coke, 7 cts., and tar, 3 cts.; leaving net cost of gas 42 cts. The items of Superintendence and repairs, being paid for by the gas sold to consumers, need not be charged on extra output for gas engine consumption. Where the cost of gas is higher than here figured, coal for steam use will be found proportionally higher, and final figures of comparison show same amount of saving.

Excess in Cost of Steam over Gas Power is thus $1.43, or nearly 16 per cent.

Coal for getting up steam and banking fires is not included in above figures, and should be added, thus increasing rate of economy of gas power beyond that shown by our figures.

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